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THE ARCHITECTURAL RECORD

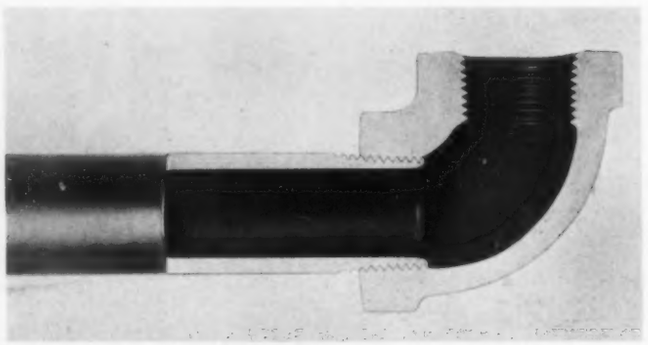
1934

3

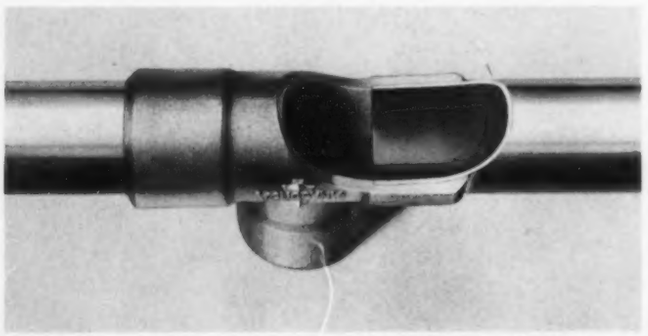
LEISURE AND THE ARCHITECT • SPECIAL BUILDING TYPES

The question is:

"What kind of rust-proof pipe?"



Cut-away section showing a perfectly cut threaded assembly of Anaconda Brass Pipe with a correctly tapered screw fitting.



Cut-away section showing completed joint of Anaconda Deoxidized Copper Tube and Anaconda Cast Bronze "Solder" Fitting.

SINCE the need for rustless plumbing was first recognized, The American Brass Company has consistently recommended standard Anaconda 85 Red-Brass Pipe connected with threaded fittings. This recommendation remains unchanged, because well-made brass pipe containing 85% of copper has always offered the greatest resistance to corrosion of any water pipe commercially obtainable at moderate cost.

Anaconda Copper Tubes and Fittings

The American Brass Company also furnishes Anaconda Deoxidized Copper Water Tubes with a complete line of Anaconda Cast Bronze Fittings of both the "Flared Tube" and "Solder" types. These are offered as standard products for underground service lines and also for interior plumbing where low first cost is the influencing factor. ¶ Our new booklet, "Anaconda Copper Tubes and Fittings", gladly mailed on request.

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To Satisfied Owners . . . A Tenant-Catching, Rental-Boosting Structure — Fresh, Modern, Inviting.

REJUVENATION OF ONE OLD-TIMER

From This Blighted, Brown-Front-Era Building, a Bright, Clean, Modern Structure, Via White Portland Cement Stucco.

TO Krempel and Erkes, architects well known in Los Angeles, came harassed owners of one dingy, out-dated hotel and store building in Redondo Beach. Bright California sunshine made apparent worn, weary, uninviting store-fronts, ginger-bread cupolas, sad-eyed windows, faded facades (see right). Equally apparent were dwindling tenant lists, lowering rentals.

Gloomily Krempel and Erkes were asked for suggestions, costs, means of modernizing. Soon, however, dour feelings were relieved, despairing owners encouraged with effective, economical plans which spared depression-squeezed pocketbooks.

Off came overhanging bays, pie-crust ornaments. On went smooth, clean, sturdy white portland cement stucco, deftly, competently troweled to simple, modern lines by plastering contractor William Trewhella. Soon did Wigg Construction Co. deliver one apparently brand-new building, fresh, modern, inviting. To satisfied owners then did Krempel and Erkes, pleased with their plans' execution, present this same tenant-catching, rental-boosting structure.

For Atlas White portland cement, basis of Velvatone stucco spread thus successfully on old walls, much credit. For other owners, architects, prompt complete information on use of Atlas White not only for stucco, but also for fine terrazzo, for cast stone, for mortar, for other uses, from Universal Atlas Cement Co., 208 South La Salle Street, Chicago.

Worn, Weary, Uninviting Store-Fronts, Ginger-Bread Cupolas, Sad-Eyed Windows, Faded Facades.

(The above page is an advertisement presented by the Universal Atlas Cement Co., Subsidiary of United States Steel Corporation)

SPECIFY G-E WHITE CONDUIT

G-E White Electrical Conduit is designed to give complete wiring protection to every type of building. The manufacturing process assures its permanence. Flexible alloy steel is Hot-Dipped Galvanized inside and out. A heavy coat of Glyptal, both inside and out, gives still further protection.

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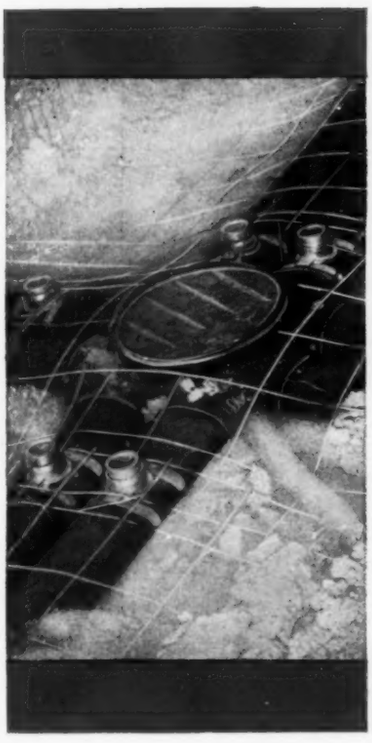
CONDUIT



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There is a G-E Wiring Device for every need. They are dependable, rugged and lasting.

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Always specify G-E Textolite Plates for use with G-E Convenience Outlets.

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ARCHITECTS' ANNOUNCEMENTS

The firm of Lundeen, Hooten, Roozen and Schaeffer, architects, having been dissolved, Archie N. Schaeffer and Philip R. Hooten announce the formation of a new firm under the name of Schaeffer and Hooten, architects, 710 Peoples Bank Building, Bloomington, Illinois, to carry on the practice of architecture as successors to the old firm.

S. Harold Fenno, architect, formerly with the late Harold Jewett Cook, has opened an office for the practice of architecture at 438 Delaware Avenue, 2d floor, Buffalo, N. Y.

The architectural practice of the firm of Bertrand and Chamberlin and of the succeeding firm of A. B. Chamberlin and E. J. Prondzinski is now being carried on under the name of Edmund J. Prondzinski, architect, at the same location, 616 Civic and Commerce Building, 107 South 4th Street, Minneapolis, Minnesota.

Roy A. Benjamin, architect, formerly located at 21 Ocean Street, Jacksonville, Florida, announces the removal of his office to Bisbee Building, Jacksonville, Florida.

Audrey C. King, architect, has opened an office for the practice of architecture at Cassville, Missouri.

MEDAL AWARD

The Medal of Honor of 1933 of the New York Chapter of the American Institute of Architects has been awarded to Robert D. Kohn, Director of Housing under the Public Works Administration. Ralph Walker, president of the Chapter and chairman of the Jury, presented the medal, which has been conferred since 1904 for "distinguished work and high professional standing." Mr. Kohn, a past president of the Institute, received the honor "for devoted and inspired national leadership of the architectural profession; for initiating the unification of the building industry; for great vision, understanding and continued national effort for the betterment of humanity in housing and city planning; for high ideals as a man; for fine qualities as an architect."

HARVARD UNIVERSITY SCHOLARSHIPS

Harvard University offers three scholarships, each with an income equal to the tuition fee, for the academic year 1934-35, to men eligible for admission, or already admitted, as special students to the School of Architecture. The scholarships will be awarded to those candidates who, having fulfilled all other conditions, stand highest in a competition in architectural design conducted by the University.

Candidates should apply to Dean G. H. Edgell, School of Architecture, Robinson Hall, Harvard University, Cambridge, Massachusetts, and must fill out and file with the Dean a blank form of application not later than Saturday, March 17th.

CALENDAR OF EXHIBITIONS AND EVENTS

March 20-31	Exhibition of work by members of the New York Chapter, American Society of Landscape Architects, to be held at the Architectural League, 115 East 40th Street, New York City.
March 26	Final date for registration, Rotch Traveling Scholarship. For information address C. H. Blackall, 31 West Street, Boston, Massachusetts.
Until April 16	Exhibition of Machine Art at the Museum of Modern Art, 11 West 53rd Street, New York City.
Until May 1	Exhibition of "New York Night Scenes," by Samuel H. Gottscho, photographer, at the Museum of the City of New York.
April 2-29	Free exhibition of The Fashion Group, Inc., 30 Rockefeller Center, New York City.
April 3-30	Industrial Arts Exposition, R. C. A. Building, Rockefeller Center, New York City, 63rd floor.
May 1	Closing date for applications, Princeton Prizes in Architecture, Princeton University, Princeton, New Jersey.
May 16-18	Sixty-sixth Convention of The American Institute of Architects to be held in Washington, D. C.
May 19-31	Competition for the Princeton Prizes in Architecture.
Until June, 1934	Remodeling Competition, conducted by the Good Housekeeping Studio, 57th Street and Eighth Avenue, New York City.

PRINCETON PRIZES IN ARCHITECTURE

The School of Architecture of Princeton University announces two competitive prizes for the scholastic year 1934-35. Applications must be filed with the Director of the School on or before May 1.

"ART IN INDUSTRY" EXHIBITION

"Art in Industry" is the theme of an exhibition to be held in Rockefeller Center during the month of April. This exhibition has been organized by a group of leading industrial designers and is sponsored by The National Alliance of Art and Industry.

FASHION GROUP EXHIBIT

This exhibit, at 30 Rockefeller Plaza, Rockefeller Center, New York City, will open to the public on April 2, and continue through April 29. The displays will include plastic products, wearable and decorative fabrics, and clothes. The exhibition will be designed by Eleanor LeMaire, interior architect.

WHAT IS MODERN ELEVATOR PRACTICE?

· NO. 1 OF A SERIES OF SIX ·

This article concerns itself with the summarizing of modern freight elevator practices. This information comes from the many years of experience of Otis Elevator Company in installing thousands of freight elevators.

Moderate Duty: (2000 to 4000 lbs.—slow speed)

For economy of both installation and operation, the most popular type today is the electric machine with DOUBLE BUTTON CONTROL. This does away with the necessity of a regular operator, as it is easily and safely handled by any one.

For this type, standard arrangements are available. For instance, for a capacity of 2500 pounds at 50-foot speed, there are two platform sizes, 5' 6" x 6' 9" or 6' 6" x 7' 6". Other standard arrangements can also be obtained.

Medium Duty: (2000 to 6000 lbs.—medium or high speed)

Elevators of this size usually require a regular operator, as they are used in medium height buildings with fairly intensive service requirements. Therefore, they are usually furnished with Car Switch Control.

A number of practical combinations of load and speed have been worked out by us for this service. On the basis of long experience, they cover adequately and economically most requirements.

Special combinations for freight and service elevators in office buildings, hotels, etc., are usually special elevator engineering problems. We have a wide range of capacities, speeds and platform sizes which permit of much elasticity in solving individual problems.

Heavy Duty: (Special—large loads with or without high speed)

These problems involve specially engineered equipment. Requirements usually call for the working out of freight elevators along engineering and experience lines. Recent examples of such special installations are the large motor truck elevators in the Starrett-Lehigh Terminal and in the Inland Port Terminal, both of New York. Four of the elevators in the latter building have capacities of 40,000 pounds, a speed of 200 feet per minute, and platforms 17' x 34'. These are the largest commercial freight elevators in the world.

General Features:

We believe that freight elevators should be engineered, manufactured, and installed with the same high precision (for safety, operation and low maintenance cost) as our high-grade passenger elevators. Otis has one standard for both.

The success of this policy has been amply demonstrated, since over a long period of years Otis has built the majority of all freight elevators furnished in this country.

OTIS Elevator Company

PUBLISHER'S PAGE

THIS ISSUE OF THE ARCHITECTURAL RECORD

LEISURE AS A FACTOR IN ARCHITECTURE

When the plan for industrial codes was made public, the chairman of the A. I. A. Committee on Industrial Relations, said in an article on longer hours of leisure as a prospective major influence in architecture that architects "will do well to think a little in advance of the inevitable trend." To facilitate such thinking the factual information available has been brought together in this issue. The material presented includes the findings of a regional investigation just concluded by the National Recreation Association to learn what recreational activities have the broadest public appeal. The report appearing in The Record is of first-rate importance, both as news and as a reference document. It is supplemented by a selected annotated bibliography and by a varied list of items bearing on the general topic of the architectural implications of leisure.

NEW-TYPE BUILDINGS

Modern means of transportation and communication, technology of production, aging of the population and so on react upon domestic life, education, recreation and ways of doing business before the resulting changes in these respects are translated into new-type buildings. It takes years for a social or economic development to achieve its potential effect upon architecture. This time lag explains why there is no surplus of new-type buildings. They have, in fact, been erected in moderate numbers during the depression. As new-type buildings must be well represented when normal building activity returns, a survey of recently constructed examples is featured in this issue.

TECHNICAL NEWS AND RESEARCH—AIR POLLUTION

This study, by H. B. Meller and L. B. Sisson, is based on the special investigation of atmosphere impurities conducted by the Mellon Institute of Industrial Research. For the architect it is particularly interesting since the authors describe the effects of air pollution on structural materials, particularly stone, metal and interior finishes, and analyze ways in which undesirable results can be prevented or overcome.

NEXT MONTH

A Checking List of essentials for building and equipping the small house.

Farmhouse Planning (data and illustrations gathered by the U. S. Department of Agriculture).

Subsistence Farmstead Planning and Construction.

New developments in production of fuel for the farm and suburban house by the use of waste.

CORRECTION

On page 104 of the February, 1934, Architectural Record, Frederick Bigger was listed as consulting architect for the Cleveland housing project. Mr. Bigger was consultant on the West Side Tract only. Henry Wright should have been given credit as consultant on the East Side Tract.

Credit should also be given to Frederick William Striebinger and Connell and Outcalt as architects for Project No. 3.

Fechner-Nesmith

VOL. 75 NUMBER 3

1934

MARCH

THE ARCHITECTURAL RECORD

LEISURE AS A FACTOR IN ARCHITECTURE

WILLIAM ORR LUDLOW, CHAIRMAN OF THE A.I.A. COMMITTEE ON INDUSTRIAL RELATIONS, HAD A SUGGESTIVE ARTICLE IN THE MAY, 1933, ISSUE OF THIS MAGAZINE ON LONGER HOURS OF LEISURE AS A PROSPECTIVE MAJOR INFLUENCE IN ARCHITECTURE. ARCHITECTS, HE CONCLUDED, "WILL DO WELL TO THINK A LITTLE IN ADVANCE OF THE INEVITABLE TREND." TO FACILITATE SUCH THINKING THE EDITORS HAVE BROUGHT TOGETHER IN THE PRESENT ISSUE THE FACTUAL INFORMATION AVAILABLE. THIS CONSISTS PARTLY OF THE RESULTS OF A QUESTIONNAIRE CONDUCTED BY THE NATIONAL RECREATION ASSOCIATION TO LEARN WHAT RECREATIONAL ACTIVITIES HAVE THE BROADEST PUBLIC APPEAL AND PARTLY OF A SELECTED ANNOTATED BIBLIOGRAPHY.

THE BIBLIOGRAPHY IS INTENDED PARTICULARLY TO CLARIFY THE QUESTION: WHAT IS MEANT BY LEISURE? IF THE WORD HAS NEW IMPLICATIONS FOR ARCHITECTURE, IT IS NECESSARY TO IDENTIFY THEM AND INCORPORATE THEM IN A REVISED DEFINITION. THE INEVITABILITY OF A PLANNED NATIONAL ECONOMY, WITH SHORTER WORKING HOURS AS AN ESSENTIAL ELEMENT, HAD INDEED BEEN FORECAST BY ADVANCING TECHNOLOGY, BUT HAD RECEIVED NO POPULAR RECOGNITION UNTIL THE PLAN FOR INDUSTRIAL CODES WAS ADOPTED A YEAR AGO. IT IS NOT SURPRISING, THEREFORE, TO FIND THAT MODERN CONCEPTIONS OF LEISURE ARE AS YET EXPRESSED WHOLLY IN TERMS OF SOCIOLOGY. THE DEFINITIONS CONTAINED IN THE BIBLIOGRAPHY ARE HELPFUL MAINLY AS A STARTING POINT FOR ARCHITECTURAL THINKING.

THE NEXT LOGICAL QUESTION IS: WHAT WILL PEOPLE DO WITH THEIR LEISURE? THERE IS NO LARGE OR VARIED BODY OF EXPERIENCE IN AMERICA TO DRAW UPON FOR AN ANSWER, NOR DOES THERE SEEM TO BE MUCH HELPFUL INFORMATION ABROAD. THE INVESTIGATION BY THE NATIONAL RECREATION ASSOCIATION IS THEREFORE OF FIRST-RATE NEWS VALUE AND WE APPRECIATE THE COURTESY WHICH ENABLES US TO PUBLISH ITS FINDINGS.

Korth-Nesmith

SECURITY AND LEISURE TIME

Korth-Nesmith

INSECURITY AND SPARE TIME

MARCH 1934

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What is LEISURE?

Fechner-Nesmith

LEISURE, as a social concept, is defined and its historical development traced in a brief but compact essay by Ida Craven which appears in the Encyclopaedia of Social Sciences. Broadly speaking, leisure is time at the disposal of the complete man, not the man who is exhausted by 14 hours of labor or 8 hours under a speed-up system and worried by insecurity; there must be more than just time for enough recreation to freshen the worker so that he can continue his toil.

For purposes of social analysis the concept of leisure is taken to mean simply freedom from activities centering around the making of a livelihood. "The artist, the scientist, the scholar, work at their art or science or research for their living; in another sense, theirs is the privilege of constant leisure to devote themselves to what are for them the highest pursuits. . . . One might say that the more nearly ideal the organization of society, the more perfectly would every individual's work be adapted to his abilities and the greater would be the number of people who enjoyed similar qualitative leisure through rather than outside of their work."

The ancient civilizations cultivated leisure as among the chief goods of life. The force of this concept, as it developed in antiquity, is indicated by the fact that the English word school is derived from the Greek word for leisure (schole). "Whatever complaints might be made against the luxury of the rich, however, the desirability of leisure itself was never really brought into question throughout antiquity or the Middle Ages. With the growth of capitalism there appeared a new and condemnatory attitude. The Puritan emphasis on the moral duty of continuous industry reflected the needs of a mercantilistic and later of an industrial economy. The further disparagement of arts and amusements represented the reaction of the vigorous rising bourgeois class to the luxury and display of the older aristocracy. . . .

"Certain changes of attitude are already apparent. When the eight-hour laws were under discussion in 1916 and 1917, the prospect of such accretions of free time led governments and social reformers to talk fearfully of the leisure 'problem.' Temperance societies prepared for increased drunkenness and attention was centered on the real evils of commercialized recreation as it prevailed in most large cities. . . . In 1924 the International Labor Office devoted part of its sixth conference to a discussion of the problem; in 1930

Nesmith

the First International Congress on Workers' Spare Time met at Liége with 300 members from 18 countries, the governments of 14 of which were officially represented. In the discussions of this congress and previously in those of the International Labor Office the emphasis had completely shifted from repression of commercial recreation to provision of facilities for other ways of utilizing leisure, and the conception of leisure as a problem had given way to its recognition as an opportunity and a cultural necessity. . . . "

European groups interested in workers' leisure have stressed the importance of proper housing and community planning as essential to a social and individual utilization of leisure. Urban congestion and bad transportation facilities prevent the enjoyment of leisure, and lack of space in the home throws the worker upon the streets and into commercialized amusements.

In the United States recreation has been largely limited to adolescents. Adult education does not exist except for a few notable exceptions. "The limited traditions of community living and the greater emphasis on the achievement of wealth as a goal have retarded the development of the idea of creative enjoyment of leisure. Nevertheless, here as in Europe, the automobile, the moving picture and the radio have provided the means for new forms of recreation which taste and economic change might transform into the basis of real leisure. . . . "

SOCIOLOGICAL ASPECTS OF NEW LEISURE. By George A. Lundberg, Columbia University. Sociology and Social Research, May-June, 1933.

Leisure is treated as a problem in this essay for two reasons: (1) Leisure time has increased, and the production of material necessities is now carried on by a small percentage of the population. (2) Urban civilization and mechanical devices have disrupted traditional leisure pursuits, thus compelling community recognition. The problems of leisure will not disappear as a result of any currently proposed reforms of our economic order; details may vary but the fundamental fact is that, under any system of control, masses of men would be relieved or prevented from occupying working hours in conventional manner.

The ultimate objective, the author states, is adjustment of the individual to the social

order. This can be achieved by a process which may be looked at from two points of view: (1) manipulation of environment, (2) conditioning of the individual. "A certain purchasing power with a corresponding education in wants, standards, and tastes would appear to achieve the most economical and efficient adjustment."

THE THREAT OF LEISURE. By George Barton Cutten. Yale University Press. 1926.

The notion of leisure as a problem finds expression in this book. To the author the concept of leisure as an opportunity brings up the question of "Opportunity for What?" in relation to workers whose minds have become standardized by industrial routine. People have been told what they must do during working hours; as for leisure they have been told what they must not do. A more positive action must be taken, he believes.

LEISURE IN THE MODERN WORLD. By C. Delisle Burns. The Century Company. 1932.

This book, based on a series of radio talks given in London in 1932, covers a variety of contemporary factors—the social effects of motor cars, motion pictures and radio; ways of escape, like gambling and hiking; changing conventions and manners; the women's movement and children's leisure utilization; and so on. Leisure, according to the author, is the most valuable product of modern mechanisms and modern social organizations, but since it is generally regarded as a negligible by-product, it is largely wasted.

The new mechanisms, like movies and the radio, have speeded up the *rate* of social change. They are the most valuable and the most dangerous instruments of education, for they involve a much greater centralization of power in the hands of a few in every country. "They are forms of education very suitable to dictatorship; and every man knows how excellent a dictatorship would be—if he were the dictator."

RESPONSIBILITY AND CULTURE. By L. P. Jacks. Yale University Press.

In a series of lectures delivered at Yale University Professor Jacks of England contrasts the concepts of labor and leisure, and defines leisure as not inaction but a higher kind of

activity: "The time when we are making the greatest demands on the services of our fellow men." That is to say, the utilization of leisure is possible only when means are provided for enjoying ourselves.

Education Professor Jacks views as the first means toward a full utilization of leisure and the fulfillment of every individual's right to self-development. The alternate objective is reciprocal education, for "unless the right to self-development immediately expands into the duty of promoting the self-development of others, the man (or the community) which possesses that right is worse off with it than he would be without it." The idea of *education*, he emphasizes, is fundamentally related to the idea of *government*, and this implies a responsibility for the educated citizen "to create values that are worth voting for."

UTILIZATION OF WORKERS' LEISURE. International Labor Conference (Geneva Labor Office, 1923), Sixth Session, Geneva, June, 1924. See also International Labor Office Annual Report, 1930, pp. 455-459.

Viewing leisure as an important study, the International Labor Office has emphasized, in its conference discussions, a twofold approach: (1) The preservation of leisure through paid work during leisure hours, improvement of transport facilities, workers' dwellings and an ordered arrangement of the working day. (2) The development of facilities for the utilization of leisure, including legislation and social hygiene.

Institutions which have been set up in recent years to facilitate workers' leisure are considered as divided into the following four classes:

1 *Improvement of economic situation of the worker.*

The object of such institutions is to give opportunity to the worker for gardening, poultry-raising and working in his home. Garden cities and workers' gardens are described as the most valuable.

2 *Promotion of physical development of worker.*

Various types of institutions are comprised, ranging from old-fashioned gymnastic clubs to modern football, athletic, alpine and similar clubs, the object of which is to encourage games and sports among workers.

Galloway

THE INFLUENCE OF THE CITY ON RURAL RECREATION HAS BEEN LARGELY NEGATIVE. BUT NOW THAT THE GROUND IS CLEARED, IT IS EXPECTED THAT ACTUAL ADOPTION OF URBAN AMUSEMENTS BY RURAL POPULATIONS WILL BE RATHER RAPID.

3 ***Development of intellectual life of worker.***

for the general and technical education of workers such institutions as libraries, courses for adults, foreign language schools, technical courses, including musical and dramatic societies, are suggested.

4 ***Development of participation in public life.***

Such institutions include workers' clubs, study circles for political, economic and social questions, public lectures, and the like.

LEISURE AND ITS USE: SOME INTERNATIONAL OBSERVATIONS. By Herbert L. May and Dorothy Petgen. A. S. Bowes & Co., New York. 1928.

In this book leisure is classified broadly as (1) nonorganized, comprising (a) types found in home, outdoor life, games, sports, and the like, and (b) commercial recreation; (2) organized, subdivided as (a) voluntary, e.g., clubs, and (b) provided, i.e., such activities as are furnished on the initiative of the few. The trend of recreation depends on the economic standard of the country; the greater the average man's surplus, the stronger his tendency to buy his pleasures.

Extensive quotations are made from the International Labor Conference report in 1924. Children's playgrounds are discussed. The main section of the book, however, is devoted to phases of recreation in France, Germany, and England.

In *France* there is a notable indifference to recreation as a problem. Workers' gardens are important. Adult education, as we understand the term, is practically nonexistent. Sports are a recent development but growing. Music and theater do not have a strong hold on people. The French government voted 100,000 francs annually (1) to encourage the development of sporting associations; (2) to encourage work of societies managing workers' gardens; and (3) to develop education. This work was very successful.

In *Germany* the people have a very strong social conscience. Since the war there has been a tremendous increase in voluntary organized recreation, especially in the field of sports. Workers' education is undertaken by the national government, the state governments and, in particular, the municipalities. Encouragement of gardens is considered one of the most important activities of social welfare work. The Youth Welfare Law of 1922, called the "Magna Charta of Youth," has served in certain ways to develop leisure time activities. A subsidy system provides for state theaters, operas, and orchestras; people's stage societies also are active.

In *England* there is a great emphasis on sport with attendant playing fields and services. Industrial welfare organizations spend large sums in this direction. Adult education provides studies including politics, history, philosophy, psychology, art, architecture, music, drama, and folk and rhythmic dancing. An important development of leisure in rural areas has occurred through community centers.

Notes on Belgium, Denmark, Czechoslovakia, Austria and Italy follow in more condensed

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form, and the book concludes with a short account of recreational activities in the United States.

AMERICANS AT PLAY. By J. F. Steiner. Report of President's Committee on Social Trends in the United States. Two volumes. (See Vol. 2, pp. 912-957.) McGraw-Hill, 1933.

In the cities churches, schools and various municipal associations have surrendered their recreational functions, which have been taken over by parks and playgrounds, libraries and museums, theaters, motion picture houses, professional athletic associations, cabarets and night clubs, and social and recreational clubs. Little progress has been accomplished in urbanization of rural recreation, although a beginning has been made.

The rural community appears to have developed a public recreational facility indigenous to itself. The influence of the city on rural recreation has been largely negative, but now that the ground is cleared, it is expected that actual adoption of urban amusements by rural populations will be rather rapid.

Facilities designed especially for recreational uses fall naturally into three classes: (1) commercial amusements, (2) public recreational facilities, and (3) facilities provided by closed groups for their own use.

The influence of city planning and model communities is necessary to make recreational areas available. At present public recreation as a proper function of government, the report continues, is only in the early stages of its development.

The annual cost of various kinds of recreation for the 1928-1930 period is given in the following table:

Travel	$6,492,151,000
Commercial Amusement	2,214,725,000
Leisure Time Association	382,500,000
Games, Sports, Outdoor Life	883,071,000

Popularity of expensive forms of recreation must not, however, be regarded as a sole cause of the nation's expanding recreational budget. Wider participation is of equal if not greater importance: 40,000,000 persons annually enjoy motor tours and a 100,000,000 weekly movie attendance explains enormous bills. These figures were reached in a period of prosperity, of course. Perhaps during a period of slower development there may be greater success in building up a recreational program that is better balanced and more carefully planned in the interests of general welfare.

PUBLIC OPPORTUNITIES AND FACILITIES FOR LEISURE TIME RECREATION, AMUSEMENT AND INSTRUCTION IN AMERICAN CITIES. Municipal Reference Library, City of Chicago, 1926.

This volume contains the results of a survey for the purpose of disclosing facilities for leisure time in various communities, especially in relation to—

1. Music, bands, orchestras.
2. Symphony and other concerts, choral classes and community singing.
3. Drama, opera, indoor and outdoor theaters.
4. Art galleries and museums.
5. Moving picture shows and lectures.

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6. Folk dancing, social dancing.
7. Indoor and outdoor games.
8. Swimming pools, baths, bathing beaches.
9. Athletics, gymnasiums, skating rinks.
10. Forest and park camping.
11. Pool and billiard tables and bowling alleys.
12. Baseball fields, boxing and wrestling contests.
13. Civic and social entertainments and meetings.
14. Other public neighborhood and community recreations.

In addition, the problem of leisure time and the value of community recreation are discussed.

The 1925 expenditures for recreation, in toto and per capita, are given for the following cities: Boston, Milwaukee, Buffalo, Washington, Rochester, Chicago, Minneapolis, Detroit, San Francisco, St. Louis, Philadelphia, Indianapolis, Baltimore, New York City, Pittsburgh, New Orleans, Cleveland. All data are presented concisely, and should be valuable to anyone interested in knowing the status of representative leisure activities in this country in the period before the depression years.

THE NEW LEISURE CHALLENGES THE SCHOOLS. By Eugene T. Lies. National Recreation Association. 1933.

This study was made by Mr. Lies for the National Recreation Association, because of a conviction that education must play a larger part in the problem of utilization of free time and that character values are inherent in play and recreation; and because of the active part played by the Association in community recreation. Emphasis is placed on the recreational aspects of leisure. Only public schools in cities of 5,000 and upward were covered in the study; rural and parochial schools were not touched.

The text is principally a report of findings as to content of school programs and prevailing teaching practice for (1) physical education, (2) reading and literature, (3) dramatics,

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(4) music, (5) arts and handicrafts, (6) nature study, (7) social training and opportunities, (8) extra-curricular activities. There are also chapters on after-school hours, vacation time for school children, evening schools, recreational opportunities for nonschool youth and adults, and the place of the school in relation to other factors in solution of the problem of leisure.

THE NEW LEISURE, ITS SIGNIFICANCE AND USE: A Selected Bibliography. Compiled by Grace P. Thornton. Bulletin of the Russell Sage Foundation Library, Number 117, February, 1933.

Probably the best and most up-to-date checklist of (1) bibliographies, (2) books and (3) periodical references on the general subject of leisure is to be found in this bulletin published by Russell Sage Foundation, 130 East 22nd Street, New York City, and obtainable at a cost of 10 cents a copy. It is recommended to those who may wish to investigate the subject in greater detail. A listing of publications on hobbies is also included.

THE LEISURE HOURS OF 5,000 PEOPLE

A REPORT OF A STUDY OF LEISURE TIME ACTIVITIES AND DESIRES CONDUCTED BY THE NATIONAL RECREATION ASSOCIATION

This investigation was made last year (May 15-August 31) by the National Recreation Association, with three major objectives: to determine (1) what people are doing in their free time, either occasionally or often, (2) what changes have occurred in the use of this free time during the past year or so, and (3) what they would really enjoy doing if the opportunity were afforded.

The individual questionnaire method, in spite of its limitations, was adopted as the only practicable means of securing from a large number of persons in a brief period data as to their free time activities and interests. The questionnaire consisted chiefly of a checklist of 94 activities covering a wide and varied range of interests. Spaces were provided beside each activity for the individual to place a check mark in case he took part in the activity (1) once in a while, (2) often, (3) more than before, (4) less than before, and (5) if he would enjoy taking part in the activity. In addition, questions were asked as to the individual's age, sex, occupation and employment status, recent changes in his recreational activities, his interest in serious study, and a few others. Persons were asked not to sign their names.

Because of limited time and the need for economy the investigation was confined to a few communities sufficiently different in size and type, however, to give a fairly representative picture. A total of 29 cities in 10 States were studied, particularly Boston; Newark; Worcester, Mass.; Irvington, N. J.; Ossining, N. Y.; Millburn, N. J.; and Durham, N. C. In order to include as typical a cross-section of the communities as possible the cooperation of a wide range of agencies was enlisted. In most instances the cooperating agencies assumed responsibility for the distribution of the questionnaires among the groups with whom they were in contact. Factors kept in mind in the placement of the blanks were a fair balance between various occupational, social, nationality and age groups, the two sexes, and between the various degrees of employment. In-

dustrial and commercial concerns placed the questionnaires so as to secure returns from executives, foremen, the sales force, skilled and unskilled laborers. Five thousand and two questionnaires, in addition to a few which were either incomplete or arrived too late for tabulation, were turned in. Among the occupations listed with more or less frequency were hatters, bellhops, housewives, embalmers, truckmen, sausage makers, freight handlers, barbers, meat cutters, weavers, teachers, social workers, librarians, authors, janitors, actresses, brokers, dancers, models, playground directors, musicians, clerks, nurses, housemaids, chauffeurs, salesfolk, telephone operators, machine operators, mill workers of all sorts and kinds, executives of many types, mechanical and construction engineers and architects. No tabulation has yet been made by occupations, but the lists indicate that the effort to reach a diversified group was successful.

Of the 4,447 people who reported their sex, nearly three out of five were women, or 2,606 women as compared with 1,841 men. The considerable number of teachers, store clerks and office workerss participating in the study doubtless explains these figures. Approximately three out of five, or 2,520 out of 4,217, reported they were single. Slightly more than one-half of the men were married—920 as compared with 829 single—whereas among the women only 777 were married and 1,691 were single. Considerably more than one-half of the participants were between 21 and 35 years of age. Only a few persons over 60 filled out the questionnaire. It is of interest that the average age of women in the study is lower than that of the men. The replies also indicated that nearly 30% of the people had little or no regular employment during the preceding year. A larger proportion of the women were employed on a full-time basis than is the case of the men.

The 5,002 persons reported a total participation of 126,442. In other words, the average number of activities taken part in by each individual was 25. Participation in home activities totaled 59,613, somewhat less than the outside activities which numbered 66,829. The average number of home activities engaged in was 12 as compared with 13 outside the home.

The field work in gathering the data was carried on by Miss Beatrice Stearns of the Association's staff. George D. Butler was largely responsible for the tabulation and interpretation of the returns and the preparation of the report, which has just been published as 83 pages of tables and text in mimeograph form. The report is obtainable from the National Recreation Association, 315 Fourth Avenue, New York City, at a cost of $1 a copy.

OUTSTANDING FACTS DISCLOSED BY THE NATIONAL RECREATION ASSOCIATION STUDY

1. The home is the center for a large and increasing percentage of leisure time activity for large numbers of people.

2. The average number of activities taken part in outside the home, especially often, is relatively small and did not increase during the past year.

3. To a considerable degree leisure time activity at the present time is largely determined by low cost and availability, rather than by the real desires of people.

4. The expressed desires of large numbers of individuals can be realized only as opportunities are made available through community provision for them.

5. The limited evidence available indicates that people working comparatively short hours but with reasonable security are utilizing their leisure increasingly in a wider range of varied activities than are people of any other employment status.

6. Age, sex and marital status are factors which have a considerable and varying influence upon people's leisure time activities and desires.

WHAT ARE PEOPLE DOING WITH THEIR FREE TIME?

ACTIVITIES PARTICIPATED IN	OCCASIONALLY	OFTEN
1. Reading newspapers and magazines	3,977	(1) 3,244
2. Listening to the radio	3,955	(2) 2,842
3. Attending the movies	3,670	(8) 1,642
4. Visiting or entertaining others	3,445	(7) 1,672
5. Reading books—fiction	3,408	(3) 2,155
6. Auto riding for pleasure	3,246	(6) 1,765
7. Swimming	2,976	(9) 1,603
8. Writing letters	2,899	(10) 1,158
9. Reading books—nonfiction	2,847	(5) 1,776
10. Conversation	2,735	(4) 2,141
11. Playing bridge (home)	2,505	(11) 1,078
12. Picnicking	2,389	(23) 740
13. Attending theaters	2,228	(18) 801
14. Parties or socials	2,193	(17) 816
15. Hiking	2,152	(19) 768
16. Card parties (home)	2,126	(24) 734
17. Family parties	1,994	(28) 617
18. Dancing parties (home)	1,972	(21) 766
19. Playing tennis	1,841	(20) 767
20. Serious study	1,837	(12) 987
21. Caring for flower garden	1,817	(14) 947
22. Attending card parties	1,813	(29) 573
23. Backyard games, etc.	1,775	(49) 382
24. Taking part in political, church or civic activities	1,747	(15) 915
25. Visiting art or other museums	1,732	(55) 352
26. Day outings	1,709	(31) 532
27. Informal play hours with children	1,702	(16) 893
28. Sewing and millinery	1,694	(22) 750
29. Reading at library	1,648	(26) 656
30. Caring for home grounds	1,625	(13) 967
31. Concerts (admission fee)	1,595	(46) 402
32. Attending lectures, debates, forums	1,592	(34) 500
33. Attending amusement parks	1,570	(40) 444
34. Attending concerts (free)	1,515	(39) 457
35. Boating	1,480	(36) 496
36. Ice skating	1,378	(38) 460
37. Playing musical instruments	1,367	(27) 655
38. Playing indoor games other than cards	1,357	(45) 471
39. Indoor game parties (home)	1,344	(37) 410
40. Carpentry, painting, repair jobs	1,342	(33) 507
41. Attending community or club dances	1,316	(35) 497
42. Baseball (playing)	1,282	(30) 542
43. Playing horseshoes	1,175	(51) 370
44. Listening to the victrola	1,173	(47) 402
45. Fishing	1,167	(60) 312
46. Reading aloud	1,115	(59) 312
47. Loafing	1,114	(48) 382

This table indicates the relative importance of various activities, based on the reports of 5,002 persons who indicated whether they had participated (1) once in a while or (2) often. The rank order is according to the first classification, but the figures in parentheses indicate the relative sequence for the second. This second column is important because frequency of participation may be a greater factor in measuring free time activity than mere range of interests or activities.

ACTIVITIES PARTICIPATED IN	OCCASIONALLY		OFTEN
48. Playing basket ball	1,104	(32)	514
49. Caring for pets	1,066	(25)	661
50. Family singing	1,037	(43)	416
51. Indoor bowling	1,030	(58)	324
52. Attending dance halls	1,005	(56)	334
53. Playing golf	977	(63)	301
54. Organized group picnics	962	(64)	293
55. Roller skating	931	(62)	306
56. Lodge meetings and activities	908	(44)	414
57. Weaving and fancy needlework	905	(52)	368
58. Taking part in amateur dramatics	904	(73)	216
59. Gymnasium classes	904	(42)	440
60. Caring for vegetable garden	899	(41)	443
61. Art—modeling, painting, drawing	846	(54)	362
62. Playing handball	842	(61)	308
63. Pool and billiards	839	(74)	211
64. Coasting	817	(75)	208
65. Camping	814	(68)	274
66. Playing volley ball	805	(65)	292
67. Home singing or concerts	804	(57)	329
68. Playing playground baseball	765	(50)	372
69. Nature study	758	(67)	276
70. Attending meetings and productions of dramatic groups	754	(71)	243
71. Singing in a choral group	716	(53)	364
72. Writing poems, stories, etc.	696	(79)	205
73. Taking part in debates, discussion groups, etc.	688	(69)	264
74. Playing croquet	675	(87)	159
75. Other lecture and study courses	633	(66)	289
76. Motor camping	624	(84)	170
77. Plays and dramatic stunts (home)	620	(78)	205
78. Bicycling	554	(81)	186
79. Taking part in Parent-Teacher activities	547	(72)	233
80. Attending meetings of musical organizations	534	(76)	207
81. Community singing	505	(83)	179
82. Hunting	484	(85)	165
83. Attending evening school	472	(70)	260
84. Play reading and study groups	428	(86)	165
85. Chess or checker clubs	392	(89)	140
86. Miscellaneous collections	392	(77)	206
87. Stamp collections	363	(88)	148
88. Playing in instrumental groups	348	(82)	181
89. Playing soccer	333	(92)	106
90. Hobbies (in and around the home)	286	(80)	201
91. Archery	280	(94)	81
92. Playing in bands, orchestras and other groups	272	(90)	136
93. Poultry raising	226	(91)	107
94. Hobbies (outside the home)	159	(93)	95

GENERAL OBSERVATIONS

1. Seven out of the ten most popular activities are carried on in or around the home; only three are outside activities.

2. All seven of the most popular home activities involve little or no expense to the individual.

3. The cost of the three outside activities is not great. In other words, the economic factor seems to be of considerable importance.

The ten activities carried on by the largest number of people are also the ten which are carried on often by most people, although the ranking of several varies between the two lists. Reading newspapers and magazines and listening to the radio are first and second respectively on both lists.

4. Two of the three outside activities on the most popular list, namely, attending the movies and swimming, drop in rank on the list of activities taken part in often. This suggests that their cost affects frequency of participation.

5. The ten most popular activities are predominantly indoor, individual, quiet or passive. The factors of group participation, social intercourse and physical activity are almost entirely lacking although they are more in evidence in the next ten.

ON THE 94 ACTIVITIES

6. The number of people reached by programs of recreational and educational agencies is small compared to those who participate in activities carried on by the individual, either at home or in informal outside activities.

7. There are only eleven activities in which as many as one-half of the people reporting take part even once in a while.

8. Few people take part in music, drama and crafts as compared with other types of activities, and the frequency with which they are carried on is correspondingly low.

9. The activities which have a much higher rank in the list of things done often—in other words in which the people taking part spend considerable time—are inexpensive and, for the most part, home activities.

10. With very few exceptions the activities which are reported by comparatively few people have a correspondingly low place in the list of activities taken part in often.

11. With a few exceptions, games, sports and outing activities are reported by relatively few people and the number who take part in them often is proportionately small.

HOW USE OF LEISURE IS INFLUENCED

ACTIVITIES RANKED IN ORDER OF TOTAL PARTICIPATION

MEN

Activities	MARRIED					SINGLE					No. Times Listed
	21 – 26	27 – 35	36 – 45	46 – 60	60 –	16 – 20	21 – 26	27 – 35	36 – 45	46 – 60	
Radio	1	2	1½	2	2	2	4½	2½	2	1½	10
Reading magazines and newspapers	2	1	1½	1	1	1	1	1	1	1½	10
Movies	3	3	4	3	8	3	2	2½	3	3	10
Swimming	4½	4	5			5	4½	5			6
Visiting and entertaining	4½	5	3	5	8		8	7	7	4	9
Reading books—fiction	6	6	6	9½	8	4	3	4	4		9
Auto riding	7	7		8	6	7	6	8	5	6	9
Playing baseball	8					8					2
Playing bridge	9	10						10			3
Playing horseshoes	10										1
Reading books—nonfiction		8	8	9½	5	6	7	6	6	9	9
Carpentry, painting and repairing		9	7	4	10					9	5
Informal play hours with children			9								1
Caring for home grounds			10	6	3						3
Caring for flower gardens				7	4						2
Conversation						9	9		9½	6	4
Backyard games						10					1
Writing letters							10		8	6	3
Attending theater								9			1
Hiking									9½		1
Fishing									9½		1
Reading at library										9	1
Total											22

WOMEN

Activities	MARRIED				SINGLE					No. Times Listed
	21 – 26	27 – 35	36 – 45	46 – 60	16 – 20	21 – 26	27 – 35	36 – 45	46 – 60	
Visiting and entertaining	1	2	3	3	5	3	4	4½	3	9
Reading magazines and newspapers	2	1	1	2	2½	2	2	1	1	9
Listening to radio	3	3	2	1	1	6	1	2	2	9
Attending movies	4	4	5	5½	2½	1	3	4½	5½	9
Auto riding	5	5	9	8	7	5	6	6½	7	9
Reading books—fiction	6	6	7	10½	4	4	5	3	4	9
Swimming	7	10½			6	8				4
Picnicking	8½	8		10½				10		4
Writing letters	8½	7	6	7	8	7	7	6½	5½	9
Sewing and millinery	10½	9	4	4					10	5
Playing bridge	10½					10	8			3
Family parties		10½								1
Caring for flower garden			8	5½						2
Reading books—nonfiction			10		10		9	9	8½	5
Caring for home grounds				9						1
Attending parties and socials					9					1
Conversation						9		8	8½	3
Attending theater							10			1
Total										18

BY AGE, SEX AND MARITAL STATUS

GENERAL OBSERVATIONS:

1. Single persons, both men and women, take part in a much greater number of activities than do married people.
2. Men in both groups participate in a slightly larger number of activities than women of the same marital status.
3. Activities outside the home are taken part in to a much greater extent by single men and women than by married persons.
4. Married men take part about equally in both outside and home activities whereas married women engage in more home than outside activities.
5. Participation varies inversely with age.
6. The decrease in range of activities as age increases is not constant for all four groups, varying from 53% for single men between ages 21–26 and 46–60 to 27% for married women. Furthermore, the decrease in outside activities is twice as great as that in home activities.
7. Single men and women 21-26 have a much more varied leisure than married persons. This advantage disappears with age, however, especially in the case of men.
8. In general, young men enjoy more leisure activities than young women, but in later life women take part in an even greater number of activities than men.
9. At 21–26 and also at 46–60 all four groups take part in approximately the same number of home activities.
10. Home activities become relatively more important than outside activities in all groups as persons become older.
11. Beyond 26 years of age, single women take part in more activities than any other group, although men, both married and single, take part in more outside activities up to 35.
12. Maximum participation among the women in the single group is at 16–20 years of age; among the men in the single group 21–26 years of age. The total number of activities of those two groups is almost identical, more of the men's activities, however, are outside the home.
13. There is a striking similarity in the ranking activities of both men and women, married and single, of various ages.

VARIATIONS IN SPECIFIC ACTIVITIES:

1. Participation in drama is unusually high among single men 21–26.
2. In educational, music and commercial recreation activities, single men participate more than married men at all ages except 36–45. There is a big drop in social activities among single men after 35.
3. Single women maintain an active interest in outing, music, educational and social activities to a much greater extent than do men beyond the age of 35.
4. In games and sports, participation is sustained to a much greater degree by married than single men. Relatively few married women take part in games and sports; active interest of both single and married women drops earlier than it does with men.
5. It is surprising that conversation which appears several times in the lists of single men and women is entirely missing in the married people's lists.
6. Reading books, especially fiction, ranks higher in the list for single persons, men and women, than for married people. Attending the movies ranks higher among single than married women; the opposite is true of visiting and entertaining.

WHAT CHANGES HAVE OCCURRED

RANK ORDER OF ACTIVITIES AS TO NET INCREASE IN PARTICIPATION

Reading magazines and newspapers	962
Listening to the radio	738
Reading books—nonfiction	610
Conversation	583
Caring for home grounds	391
Caring for flower garden	334
Reading books—fiction	322
Swimming	319
Visiting and entertaining	316
Serious study	272
Informal play with children	253
Carpentry	232
Auto riding for pleasure	232
Taking part in political, church, and civic activities	219
Sewing and millinery	188
Caring for pets	167
Caring for vegetable garden	143
Playing tennis	135
Playing bridge	122
Reading at library	102

RANK ORDER OF ACTIVITIES AS TO NET DECREASE IN PARTICIPATION

Listening to the victrola	188
Ice skating	185
Attending movies	184
Attending legitimate theater	148
Coasting	137
Pool and billiards	136
Indoor bowling	109
Motor camping	101
Attending amusement parks	99
Backyard games	96
Bicycling	91
Playing croquet	76
Roller skating	75
Playing golf	74
Playing musical instruments	46
Stamp collecting	43
Attending concerts (admission fee)	43
Archery	38
Weaving	37
Attending dance halls	36

IN THE USE OF LEISURE TIME?

This table indicates in rank order the 20 activities which the largest number of people reported taking part in *more* than before as compared with the number doing them *less*. It represents, in other words, those showing the greatest net increase in participation, which is perhaps the truest picture of the trends in leisure time activity during the year preceding the study.

CONCLUSIONS:

1. Increased leisure time activity has been centered primarily in and around the house. Nine out of the first 10 and 15 of the first 20 showing a net increase are home activities.

2. Passive forms of recreation head the list and 14 of the 20 activities are quiet in nature.

3. With two or three exceptions, their cost is negligible and several activities involve actual or potential economic returns.

4. Social and large group activities are few. Types involving team play, such as organized games, bands and orchestras, are entirely missing. In this respect, and also in its lack of outing activities, the list indicates a somewhat unbalanced development.

A study of the activities taken part in *less* is also needed in judging the changes during the past year. This table indicates the 20 activities which the largest number of people reported taking part in *less* than before as compared with the number doing them *more*. In other words, it lists in rank order those showing a net decrease in general participation.

CONCLUSIONS:

1. The activities showing decreased participation are in rather striking contrast to the list showing increased participation. Fifteen of the 20 activities done less are outside the home.

2. Fourteen are characterized by physical and, in several cases, strenuous activity. Only 4 are passive in nature.

3. More than one-half of the twenty involve considerable expense.

4. Most of the activities are essentially individual rather than group or social in type. The effect of mild winters is reflected in the decrease in winter sports. Dance halls suffered less than the other commercial activities, confirming reports that many young people go there for lack of other opportunities.

COMPARISONS

A STUDY HAS BEEN MADE OF THE CHANGES REPORTED BY FOUR EMPLOYMENT GROUPS FOR THE PURPOSE OF DETERMINING THE PARTICULAR ACTIVITIES IN WHICH THE CHANGES HAVE BEEN MOST MARKED

ACTIVITIES WHICH TWICE AS MANY PEOPLE REPORT DOING **MORE**: BY EMPLOYMENT GROUPS

FULL TIME	PART TIME	OCCASIONALLY	NOT AT ALL
Carpentry and repair jobs	Caring for home gardens	Attending meetings and productions of drama groups	Caring for vegetable garden
Caring for pets	Sewing and millinery	Caring for home grounds	Caring for home grounds
	Art	Sewing and millinery	Sewing and millinery
	Carpentry and repair jobs	Carpentry and repair jobs	Loafing
	Loafing	Loafing	Family singing
	Family singing	Home sings	Listening to radio
	Home sings or concerts	Listening to radio	Reading books—fiction
	Listening to radio	Reading books—fiction	Reading books—nonfiction
	Reading books—fiction	Reading books—nonfiction	Serious study
	Reading books—nonfiction	Playing bridge	Caring for pets
	Informal play hours	Visiting and entertaining others	Playing playground baseball
	Caring for pets	Informal play hours	Hiking
	Hobbies (home)	Miscellaneous collections	Camping
	Playing basketball	Hobbies (home)	Nature study
	Attending concerts (free)	Swimming	Fishing
	Play reading and study groups	Taking part in church, political or civic activities	Playing in band or orchestra
	Reading at library		Attending evening school
	Attending evening school		Lecture or study courses
	Taking part in Parent-Teacher activities		Visiting art and other museums
	Visiting art and other museums		Taking part in church, civic or political activities
	Attending parties and socials		
	Hobbies (outside)		

In addition, the following three activities belong in each group's list:
Caring for flower garden
Reading magazines and newspapers
Conversation

1. People employed full time have a diminishing variety and frequency of leisure time activity. This group has not only the fewest activities in the list showing the greatest net increase, but also the largest number of activities in the list indicating lessened participation. It is obvious that people employed full time do not have as much free time as the other groups.

2. The part-time group enjoys the most favorable position as to range and increasing richness of activity. It may be fairly assumed that a majority of this group have more leisure time than those employed full time, that they have a degree of security in their jobs even though incomes are rather limited. The activities done less than before are few and relatively unimportant as compared with those done more. The reports seem to indicate that the added leisure resulting from part-time employment makes possible, and is already being used for, a richer recreational life.

3. The situation with respect to people occasionally employed or entirely without employment is less clearly defined. In every comparison the unemployed are in a much less favorable position, with respect to the range, frequency and changes in their leisure time activities than are the people employed part time. Obviously, they are handicapped by enjoying freely their free time, which for the most part is not due to their choice. The activities they are doing *more* include a varied and highly desirable list but many types of activity are entirely closed to them. It is evident that these two groups, even more than the people employed full time and part time, are largely dependent upon either their own limited resources or those provided by public and private agencies for opportunities to enjoy and benefit by their abundant free time.

ACTIVITIES WHICH TWICE AS MANY PEOPLE REPORT DOING **LESS**: BY EMPLOYMENT GROUPS

FULL TIME	PART TIME	OCCASIONALLY	NOT AT ALL
Backyard games	Weaving and fancy needlework	Playing in instrumental groups	Backyard games
Art	Listening to victrola	Writing poems, stories, etc.	Listening to victrola
Loafing	Stamp collecting	Playing baseball	Hobbies (home)
Listening to victrola	Playing golf	Playing volley ball	Playing volley ball
Writing poems, stories, etc.	Indoor bowling	Playing golf	Pool and billiards
Dancing parties	Fishing	Playing horseshoes	Roller skating
Playing baseball	Coasting	Indoor bowling	Attending concerts (with fee)
Playing volley ball	Community singing	Pool and billiards	Attending legitimate theater
Playing basketball		Organizing group picnics	Attending movies
Playing croquet		Day outings	Taking part in amateur dramatics
Playing horseshoes		Motor camping	Lodge meetings and activities
Archery		Camping	
Pool and billiards		Fishing	
Gymnasium classes		Bicycling	
Camping		Roller skating	
Hunting		Chess and checker clubs	
Coasting		Attending amusement parks	
Bicycling		Attending dance halls	
Taking part in amateur dramatics		Attending legitimate theater	
Attending parties and socials			
Chess and checker clubs			
Attending amusement parks			

In addition, the following two activities belong in each group's list:
Playing soccer
Ice skating

WHAT DO PEOPLE REALLY WANT?

One purpose of the study was to learn the things which people really desire to do during their leisure hours. Each person was asked to indicate what he or she would enjoy doing and which there is now little or no opportunity to take part in. It was felt that this type of information would more truly indicate needs than a recording merely of people's interests. Many persons failed to fill out this part of the blank, either due to indifference or to lack of appreciation or understanding of leisure time interests. Doubtless the desires expressed by many people were based upon or limited by their experience which in many cases has been meager. The desires which were expressed, however, give an interesting picture as to the unmet recreational wants of a large number of individuals.

Since taking part in an activity, especially if infrequently, naturally influences the desire for more opportunity, the accompanying table of most desired activities also lists the total number of people taking part as well as those reporting frequent participation. The activities are listed according to rank of expressed desires. It should be kept in mind that if all the 5,002 persons had reported what they would enjoy doing, the numbers indicating desires in this table would be approximately 50% greater.

RECREATIONAL ACTIVITIES DESIRED BY MOST PEOPLE

ACTIVITY	No. REPORTING DESIRE FOR	TOTAL No. TAKING PART	No. PARTICIPATING OFTEN
Playing tennis	837	1,841	767
Swimming	793	2,976	1,603
Boating	773	1,480	496
Playing golf	732	977	301
Camping	676	814	274
Caring for flower garden	666	1,817	947
Playing musical instrument	660	1,367	655
Auto riding for pleasure	639	3,246	1,765
Attending legitimate theater	617	2,228	801
Ice Skating	597	1,378	460
Hiking	576	2,152	768
Taking part in amateur dramatics	575	904	216
Fishing	564	1,167	312
Listening to the radio	546	3,955	2,842
Attending movies	538	3,670	1,642
Picnicking	535	2,389	740
Motor camping	525	624	170
Attending concerts (free)	511	1,515	457
Gymnasium classes	493	904	440
Reading books—fiction	486	3,408	2,155

CONCLUSIONS:

1. Games, sports and outing activities head the desired list. The 5 activities desired by the greatest number of people are of this type; so are 12 out of the first 20 on the list.

2. Outside activities predominate. Only 4 of the first 20 are home activities.

3. Physical activity is greatly desired. Only 6 quiet or passive activities are found in the first 20 on the preferred list.

4. Social and organized group activities are conspicuously absent; of the first twenty only two—taking part in amateur dramatics and gymnasium classes—necessarily involve cooperation, although several may be conducted on a group basis.

5. The things most desired are obtainable as a rule only at cost to the individual. With the possible exception of caring for the flower garden, the entire list of 10 most desired activities involve some individual expenditure, either for equipment, instruction or admission fees. Several involve costs of two or more types.

6. More than one-half of the activities—and the ones which are desired by the largest number—cannot be provided by the individual himself. They involve facilities, organization, leadership or some other special provision by public or private agencies.

7. There is no consistent ratio between the number of people desiring to take part in the various activities and the number already taking part. Where the majority of people already take part, a relatively less unmet desire is recorded. On the other hand, many people would enjoy participation in some activities in which large numbers already take part, such as auto riding and swimming.

8. Activities which train people for jobs or which have a direct economic value are absent from the list. No adult education activities such as serious study, lecture courses or evening school are represented in the list.

CONCLUSIONS:

1. The widespread appeal of the activities which were found to be desired by the largest number of individuals, for the whole study, is apparent from the fact that 9 of them appear at the head of the list of activities desired most by the various age groups, men and women. Ice skating alone is missing from the list and its place is taken by listening to the radio.

2. Ice skating is listed as one of the 10 most desired activities by 5 of the 9 women's groups, most of them single women. This group comprised more individuals than any other in the study, so the high ranking of ice skating is accounted for.

ACTIVITIES MOST DESIRED BY MEN

ACTIVITY	MARRIED					SINGLE				No. times listed
	21–26	27–35	36–45	46–60	60–	16–20	21–26	27–35	36–45	
Tennis	1½	8	10			3	1	1	5½	7
Swimming	1½	1	7			2	3½	2½	5½	7
Fishing	3½	2	1	1	4½		9½		1	7
Baseball	3½					4				2
Pool and billiards	6								5½	2
Boating	6	7	5½	2		1	3½	8	5½	8
Hunting	6		5½	10		6		9½		5
Camping	8½	5½		8½			9½	4½		5
Auto riding	8½	9½	2	3	4½	7		4½		7
Playing musical instrument	11					8½	5	6½		4
Playing basketball	11					8½				2
Listening to radio	11		8½	4½	9	10				5
Attending the movies		3	4	6½						3
Golf		4	10		9	5	2			5
Attending the theater		5½	3				6	2½		4
Bowling		9½							5½	2
Picnicking			8½							1
Caring for flower garden			10	4½	9					3
Backyard games			10		11½					2
Caring for vegetable garden				6½						1
Poultry raising				8½	11½					2
Reading books—nonfiction					4½					1
Caring for pets					4½					1
Reading magazines and newspapers				9						1
Playing horseshoes				9						1
Motor camping							7			1
Taking part in amateur dramatics							8			1
Attending concerts (free)								6½	5½	2
Attending evening school								9½		1
Gymnasium classes									5½	1
Attending card parties									5½	1

Note: Figures indicate rank order of activity according to number of persons desiring it.

3. The extent to which outside rather than home activities are most desired is indicated by the fact that the former appears 73 times in the women's lists as compared with 24 desires for home activities. The difference in the men's lists is even more marked: 75 outside as compared to 20 inside activities.

4. A much wider range of activities is represented in the ranking lists indicating desires than in the corresponding lists representing activities engaged in. This suggests that opportunities for taking part in many of the desired activities are limited.

5. Except for the activities appearing frequently in the lists of both married and single people, home activities predominate in the list of desires of both married men and women. On the other hand all but one of the leading desires of single men and women alone are outside activities. Single women desire strenuous, outdoor activities for a larger period than do married women.

ACTIVITIES MOST DESIRED BY WOMEN

ACTIVITY	MARRIED				SINGLE					No. times listed
	21–26	27–35	36–45	46–60	16–20	21–26	27–35	36–45	46–60	
Tennis	1½	7½			2	2	1			5
Caring for flower garden	1½	1	1	1		5	5	2	2½	8
Playing musical instrument	3½	7½			4½		6			4
Boating	3½				1	3½			8½	4
Camping	5				3	10		10½		4
Swimming	7	2	11		4½	3½	3	6		7
Picnicking	7	9½						6	8½	4
Roller skating	7				10	7				3
Ice skating	9				7	8	9½	10½		5
Playing golf	10½				6	1	2	3		5
Bicycling	10½				9					2
Auto riding		5	5	8				7½	8½	5
Attending concerts (free)		3½	5	6½					8½	4
Taking part in amateur dramatics		9½	11		8	6	4			5
Attending theater		6	5					1	4	4
Attending movies		3½	2½	9						3
Listening to radio			2½	2						2
Caring for vegetable garden			7	3						2
Reading magazines and newspapers			8½	4½						2
Attending concerts (fee)			8½				9½	4	2½	4
Reading books—fiction			11							1
Visiting and entertaining				4½						1
Sewing and millinery				6½						1
Caring for home grounds				9						1
Listening to victrola				9						1
Hiking						9	8	7½		3
Gymnasium classes							7			1
Nature study										1
Archery								6		1
Visiting museums									5	1
Reading books—nonfiction									8½	1
Day outings									8½	1

Note: Figures indicate rank order of activity according to number of persons desiring it.

THE ECONOMIC SIGNIFICANCE OF VOLUNTARY LEISURE

BY HAROLD S. BUTTENHEIM
EDITOR, THE AMERICAN CITY

The remarkable development in recent years of the automotive and motion picture and radio industries is bringing to many former thrift-worshippers a new point of view. Doubtless more than half of the immense sums spent annually on the purchase and operation of automobiles can be attributed to the urge of pleasure or luxury, rather than to business needs. But no one believes that if the American people were to refrain from these expenditures on leisure-time enjoyment the nation would become richer. No, what we need is a bolder approach to the more abundant life—more abundant both for those who spend wisely and for those who profit economically thereby.

For the architect or landscape architect who is looking to the future with hope, rather than to the past with regret, the coming age of voluntary leisure offers a challenge. The structure and facilities to be designed will be manifold: libraries, museums, educational buildings, community houses, theaters, auditoriums, parks, playgrounds, swimming pools, bath houses, golf courses, country club buildings, stadiums, baseball and football fields, tennis courts, gymnasiums, bowling alleys, dance pavilions, summer resort hotels, tourist camps, parkways, bridle paths, skating rinks, toboggan slides, and the rest of the list which might range alphabetically from airports to yacht basins.

More than one man of wisdom, from Aristotle to John H. Finley, has pointed out that a true end of education is to make possible the best use of leisure. May it not be that the best use of the architect's present leisure will be to advance this true end of education?

PORTFOLIO

TRANS-LUX THEATER, NEW YORK CITY. THOMAS W. LAMB, ARCHITECT.

VIKING APARTMENTS, MILWAUKEE, WISCONSIN. MARTIN TULLGREN AND SONS, ARCHITECTS.

AN EXHIBITION ROOM, HAMBURG, GERMANY. KARL SCHNEIDER, ARCHITECT.

A PROPOSED INTERNATIONAL STUDENT CENTER, GENEVA, SWITZERLAND. ALFRED ROTH, ARCHITECT.

PROPOSED PARKING GARAGE, BUS STATION AND HOTEL, RICHMOND, VIRGINIA. LEE, BALLOU AND VAN DEVOORT, ARCHITECTS.

A NEWS REEL MOVIE IN A RAILROAD STATION. CINCINNATI UNION TERMINAL, CINCINNATI, OHIO. FELLHEIMER AND WAGNER, ARCHITECTS.

DRIVE-IN THEATER, CAMDEN, NEW JERSEY. DESIGNED BY R. M. HOLLINGSHEAD, JR.

SHOWROOM FOR REUSS STUDIOS, INC., NEW YORK CITY. ERNST AUERBACH, DESIGNER.

U. S. POST OFFICE AT GLEN COVE, LONG ISLAND DELANO AND ALDRICH, ARCHITECTS.

SHOPPING CENTER, GLENDALE, CALIFORNIA. GORDON B. KAUFMANN, ARCHITECT.

JEWELRY STORE FOR FINLAY STRAUS, NEW YORK CITY. PERCIVAL GOODMAN, INC., ARCHITECTS.

APPLE STORAGE WAREHOUSE, CROZET, VIRGINIA. VAN RENSSELAER H. GREENE, ENGINEER.

FACTORY BUILDING FOR THE OTIS ELEVATOR COMPANY, TOKYO, JAPAN. ANTONIN RAYMOND, ARCHITECT.

FRENCH EMBASSY, TOKYO, JAPAN. ANTONIN RAYMOND, ARCHITECT.

TWO SERVICE STATIONS, TOKYO, JAPAN. BY ANTONIN RAYMOND, ARCHITECT.

A SERVICE STATION, YOKOHAMA, JAPAN. ANTONIN RAYMOND, ARCHITECT.

POLICE AND FIRE STATION, NEEDHAM, MASSACHUSETTS. GEORGE ERNEST ROBINSON, ARCHITECT.

MERCHANDISE MART, ST. LOUIS, MISSOURI. PRESTON J. BRADSHAW, ARCHITECT.

A BUS TERMINAL, NEW YORK CITY. THOMAS W LAMB, ARCHITECT.

THE RESPESS AIRSHIP DOCK. ROBINSON AND STEINMAN, CONSULTING ENGINEERS.

A SUBWAY GROCERY STORE FOR THE "A. & P.," PHILADELPHIA, PENNSYLVANIA.

SPORT AND COMMUNITY CENTER, BRESLAU, GERMANY. RICHARD KONWIARZ, ARCHITECT.

MUNICIPAL AIRPORT AND RECREATION CENTER, ENTERPRISE, ALABAMA. H. L. HOLMAN, JR., ARCHITECT.

A CAFE AT CANVEY ISLAND, ENGLAND. CHRISTIANI & NEILSEN, LTD., ENGINEERS.

COMBINED FOOTBRIDGE AND PIPE LINE. CHRISTIANI & NEILSEN, LTD., ENGINEERS.

Photos by F. S. Lincoln

TRANS-LUX THEATER, NEW YORK CITY

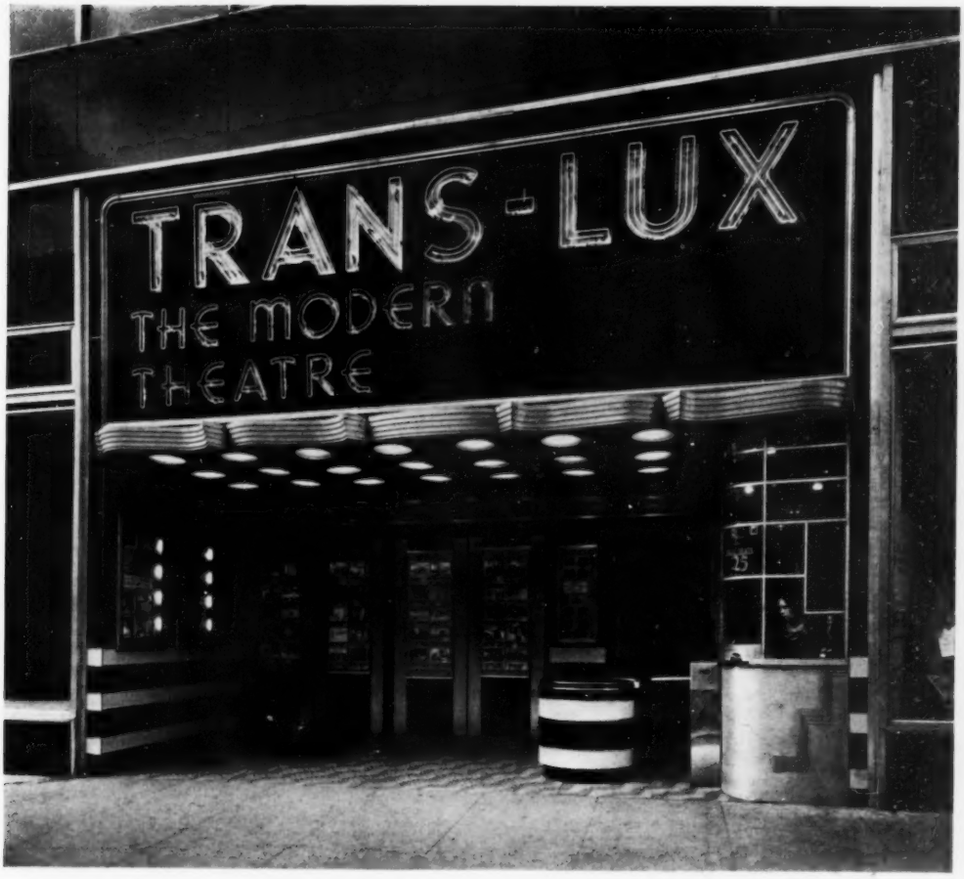
THOMAS W. LAMB, ARCHITECT

Projection is from the back of the screen. It was developed from the daylight screen used in stock exchanges and brokerage offices. The reversal of film required by this method is accomplished in the lens system. This projection method was described in The Architectural Record, June, 1932, page 38.

This theater has 450 seats, spaced 42" apart, back to back, allowing clearance and without disturbing persons seated. The theater can accommodate 25,000 persons per week. The theater is intended for a short program consisting of ½ hour news and ½ hour short reels (animated cartoons, comedy, etc.).

The plan includes a spacious lounge and toilets for men and for women. The women's toilet is furnished with dressing tables.

The air-conditioned air is changed every three minutes, and is adjusted to 72°, winter temperature, and 70-78° summer temperature.



ENTRANCE

GENERAL VIEW OF
THEATER BUILDING

TRANS-LUX THEATER, NEW YORK CITY

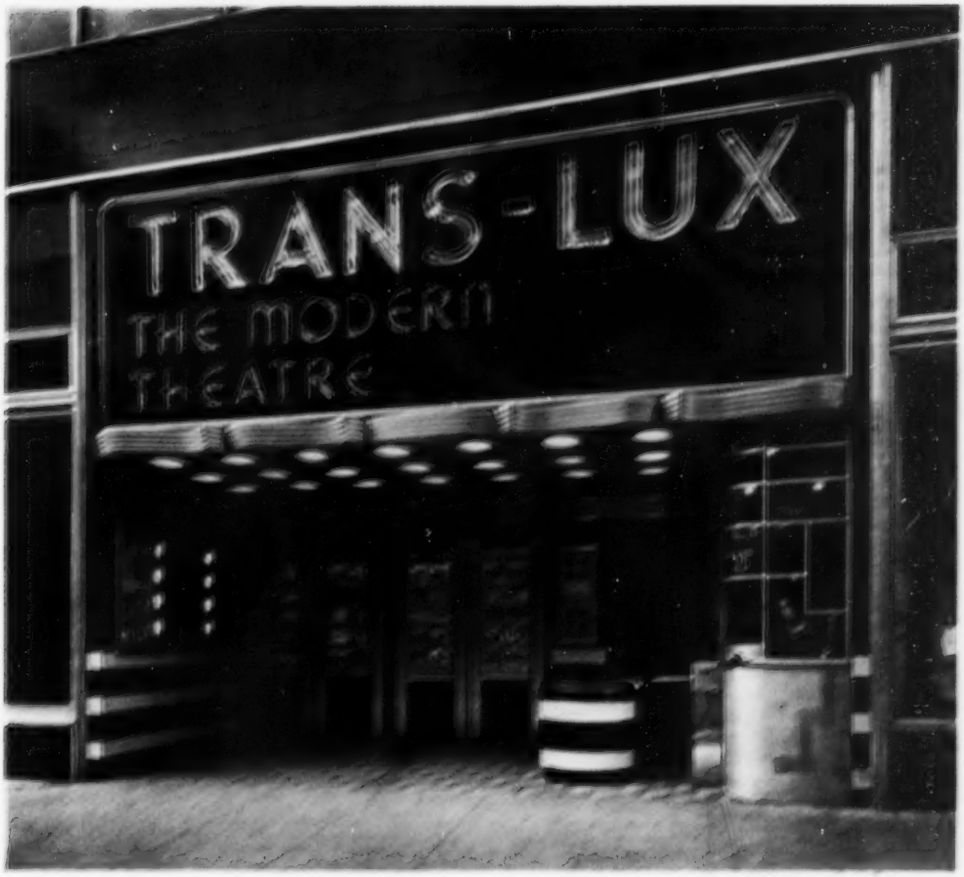
THOMAS W. LAMB, ARCHITECT

Projection is from the back of the screen. The distance from the skylight screen used is about seventy-six feet. The success of the machine by this method is accomplished in the two lenses. This projection method was described in The Architectural Record, June 1930, page 516.

The theater has 490 seats, spaced 40" apart back to back allowing clearance and without disturbing patron seated. The theater can accommodate 21,560 persons per week. The theater is intended to show programs consisting of (1) News reels, and (2) Short reels (animated cartoons, comedy, etc.)

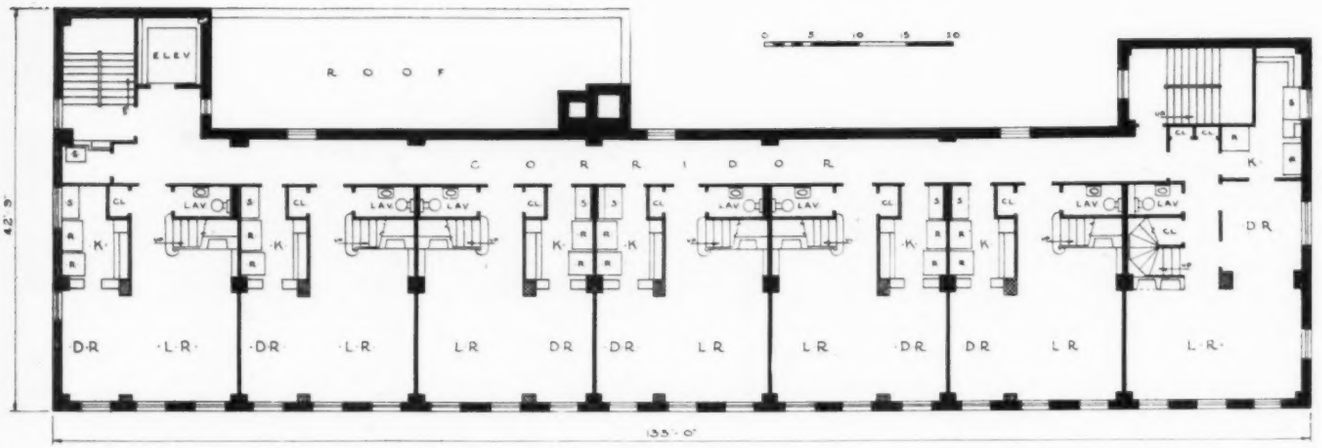
The plan includes a smoking lounge and toilets for men and for women. The women's toilet is furnished with dressing tables.

The air-conditioning of the theater uses fresh air, and is adjusted to 72° wet-bulb temperature and 70° dry-bulb temperature.

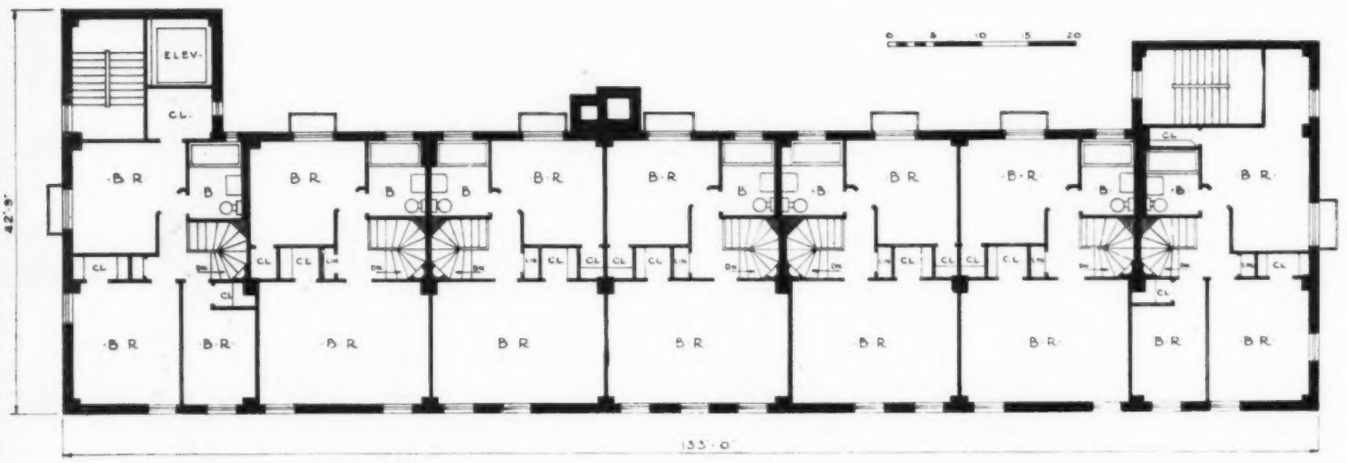


ENTRANCE

GENERAL VIEW OF
THEATER BUILDING

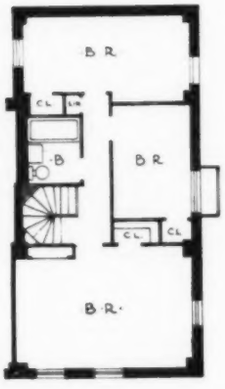


PLAN AT CORRIDOR LEVEL



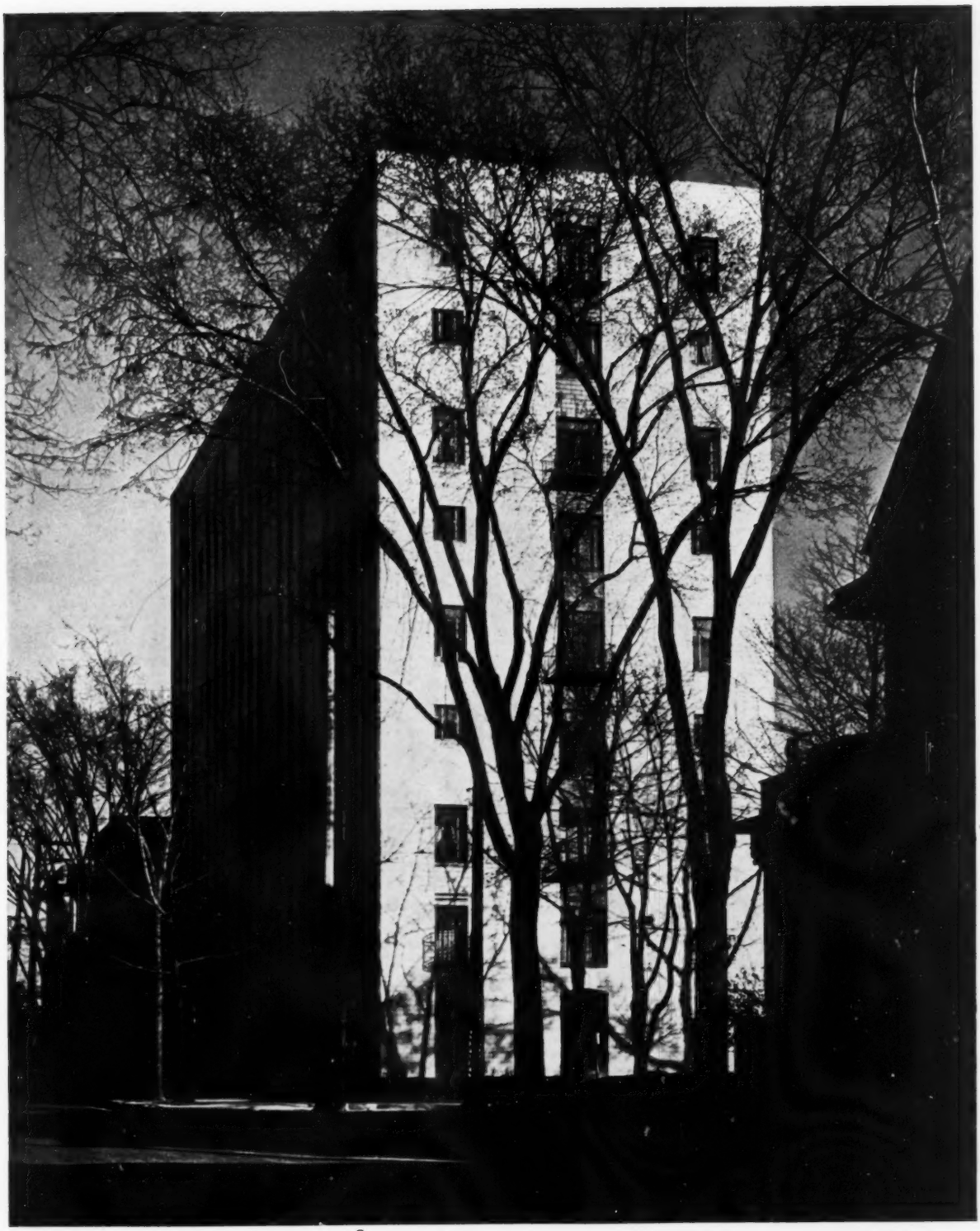
PLAN AT BEDROOM LEVEL

This apartment house, developed by Milwaukee architects, is the forerunner of a newly developed plan for residence apartments. The new Tullgren Plan places corridors on alternate floors. The separate apartments occupy two floors accessible from the corridors. By reducing corridor space there is an increase in space utilized for rooms of the apartment. Under the Tullgren Plan, the units that account for 80 per cent of total building cost are standardized and may be purchased and prefabricated locally. Prefabrication of this type is essentially an assembly operation and may be conducted advantageously by local labor.



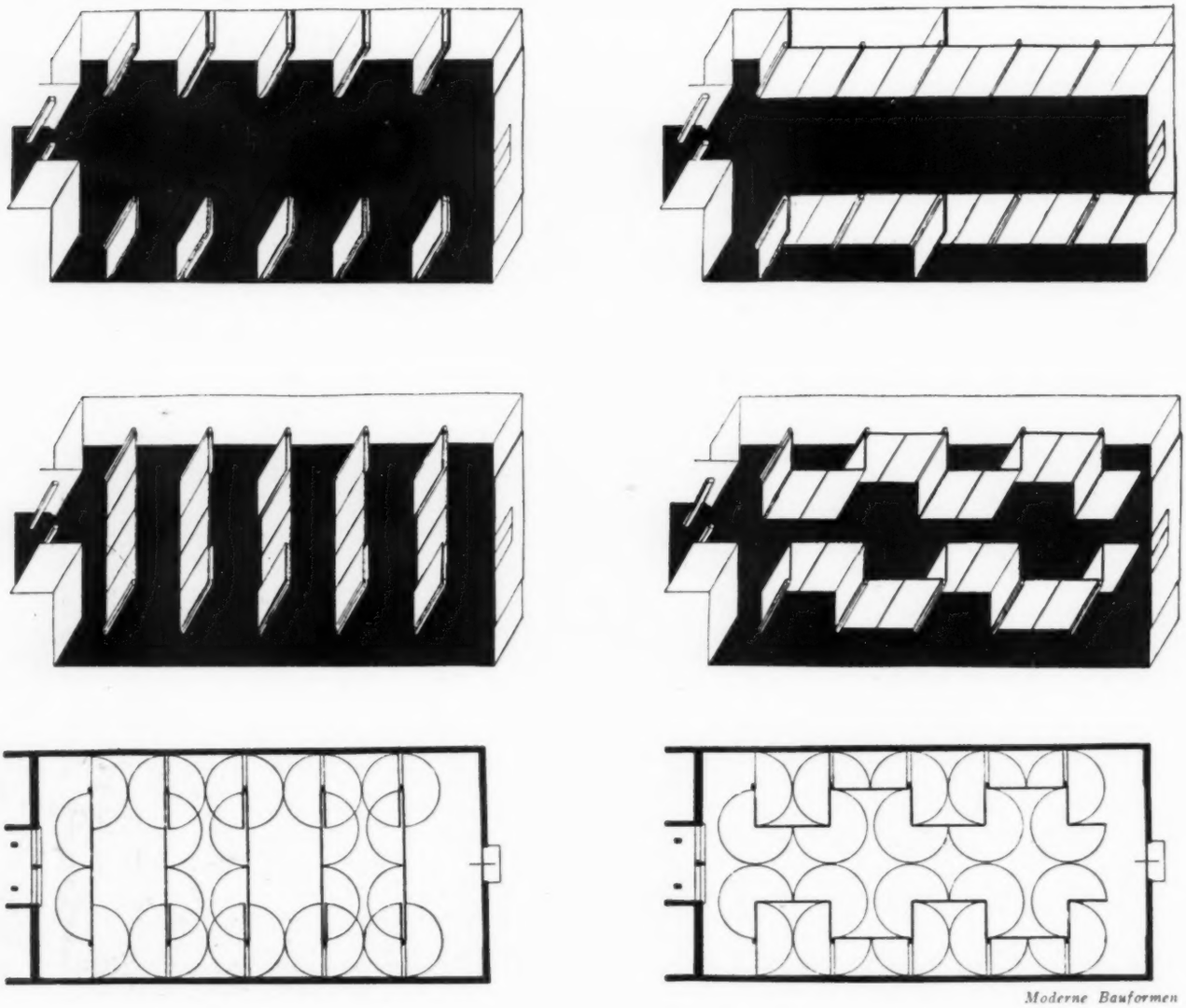
BEDROOM PLAN
FOR TOP FLOOR

VIKING APARTMENTS, MILWAUKEE, WISCONSIN
MARTIN TULLGREN AND SONS, ARCHITECTS



EXTERIOR

VIKING APARTMENTS, MILWAUKEE, WISCONSIN
MARTIN TULLGREN AND SONS, ARCHITECTS



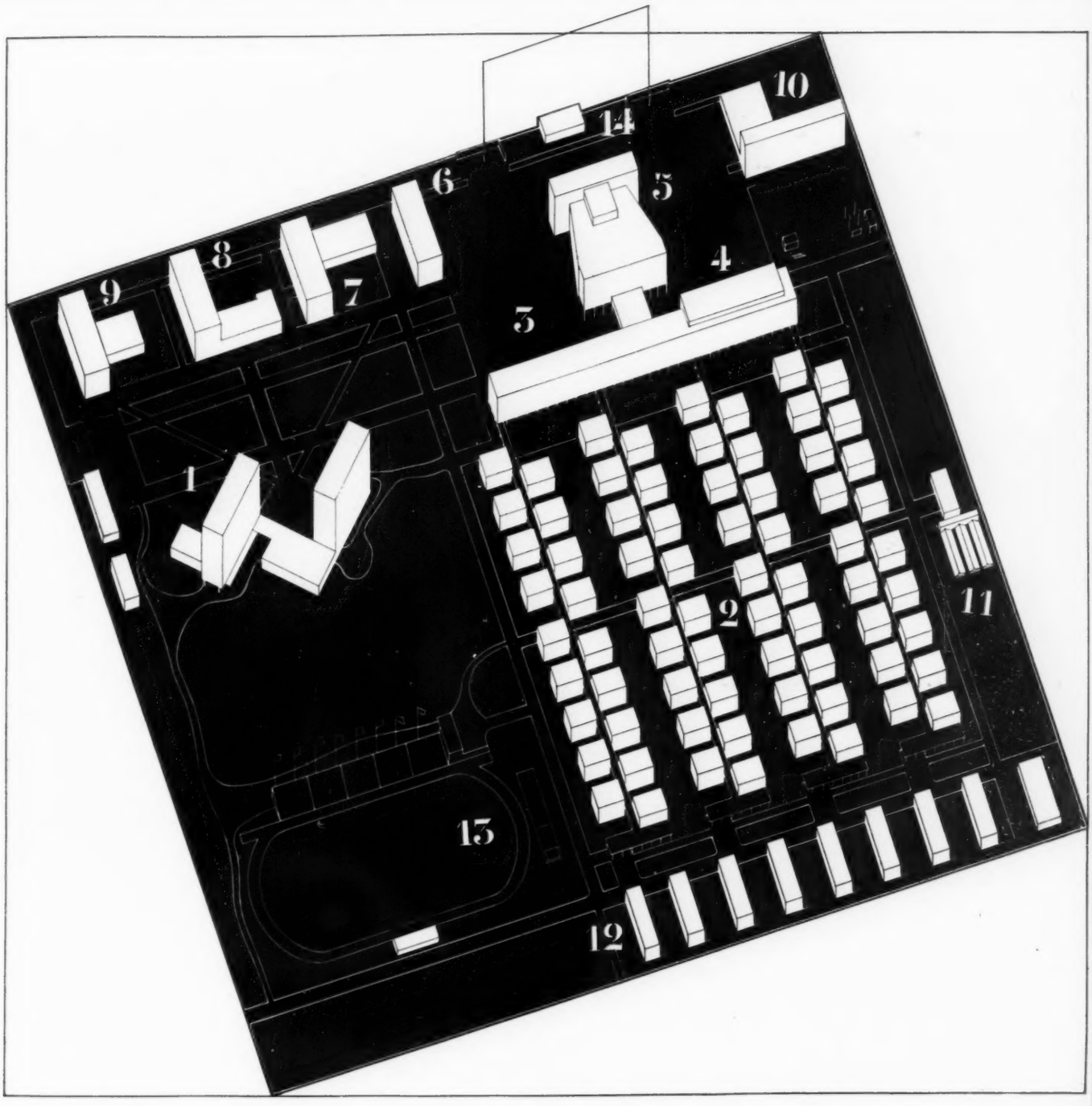
Moderne Bauformen

AN EXHIBITION ROOM, HAMBURG, GERMANY

KARL SCHNEIDER, ARCHITECT

Most art exhibition rooms are not designed exclusively for display of pictures. They are also used for sculpture, prints, photography, architecture, etc. Each of these arts has certain conditions. There also exists the problem of exhibiting various arts at the same time. The ideal exhibition room must at any time be able to fit these different conditions. We should be able to isolate and to divide; to reduce and extend space. The best solution, therefore, is a flexible room such as the architect Karl Schneider, professor at the State Art School in Hamburg, has designed in his remodeling of the Hamburg Art Association Building. The remodeling was done at minimum cost.

Partitions are of flexible wood veneer panels. The illustrations show some of the combinations which can be made with these panels. The amount of wall space can be multiplied about three times inside a given space. The room has a complete skylight in order to insure lighting under all conditions.



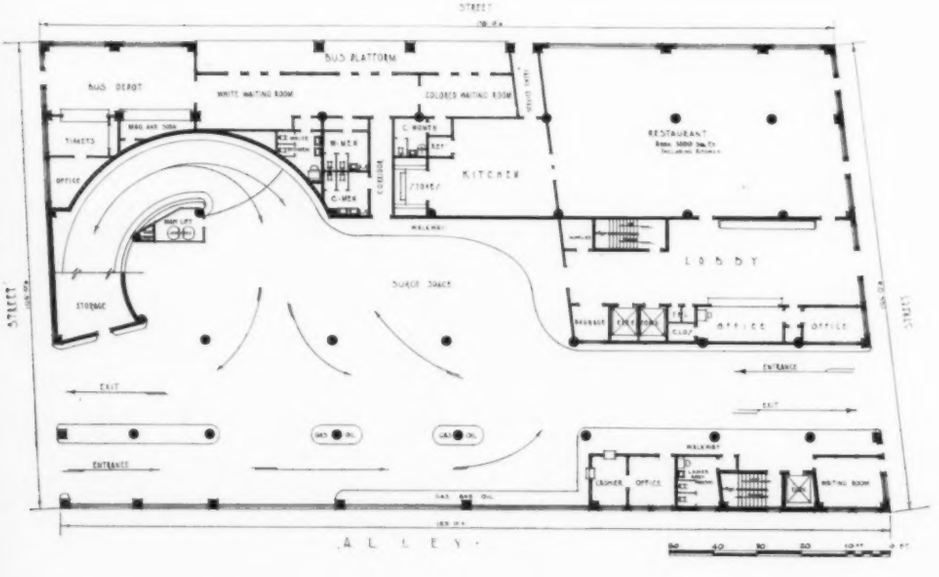
1 Dormitory 2 Studios (one pavilion for every nation or region) 3, 4, 5 Classrooms, library, auditorium 6 Hygienical (dwelling, working, recreation, transportation) 7 Institute of production and absorption (statistical, pictorial material) 8 Anti-war museum 9 Ethnographic institute (present state of countries and people and their production ability—pictures, maps, films, etc.) 10 Architectural and engineering school. The school accepts modern architecture as an essential factor in modern social life. Young architects and craftsmen are given the opportunity of developing their profession in close contact with the other activities of the school. 11 Agricultural experimental farm (to contribute to the food supply of the institution) 12 Housing for permanent collaborators, teachers, visitors 13 Sporting grounds, stadium, play areas 14 Radio station

Since the spring of 1931 there has existed in Geneva a college for working people composed of about 40 students from the following countries of northern Europe: Denmark, Finland, Norway and Sweden. The aim of this school is to study and coordinate the economical, political and social problems which these smaller nations have in common. Some of the initiators are permanent or temporary collaborators in the International Department of Labor of the League of Nations. This school, however, is entirely independent from other international institutions in Geneva and has no political character. Geneva has been chosen for its seat, because the work of such an organization is only fruitful when it is done outside the states interested in it and also because of the existing institutions in Geneva. At the present time the three-months courses are held on a country estate near Geneva. Much interest in this type of school exists not only in the northern states of Europe but also in international circles because of the excellent results obtained. There has come to light the thought of making it accessible also for students of other nations than those which were the founders. The reproduced drawing may be called a proposal for a fully expanded international school.

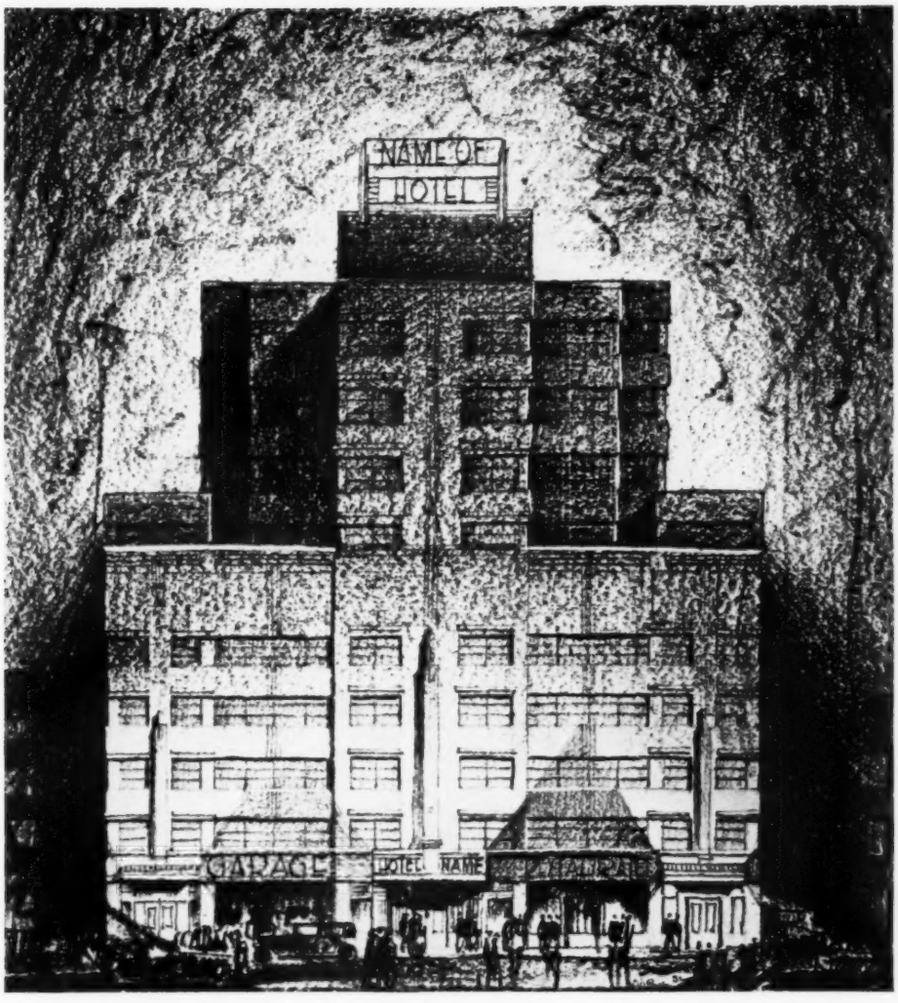
A PROPOSED INTERNATIONAL STUDENT CENTER, GENEVA SWITZERLAND. ALFRED ROTH, ARCHITECT

TYPICAL HOTEL PLAN

TYPICAL GARAGE PLAN



STREET LEVEL PLAN



STREET ELEVATION

PROPOSED PARKING GARAGE, BUS STATION AND HOTEL, RICHMOND, VIRGINIA

LEE, BALLOU AND VAN DEVOORT, ARCHITECTS

This building offers convenience of a storage or parking garage, hotel accommodation and is also intended as an auto bus station. Persons who stop at the hotel drive into the building where they place their car in the care of an attendant. They then go by elevators to the hotel lobby on an upper floor. On checking out of the hotel, an attendant is given the storage ticket and the car is delivered at the waiting room on the first floor. The hotel is not restricted to persons with cars but is intended also for general patronage.

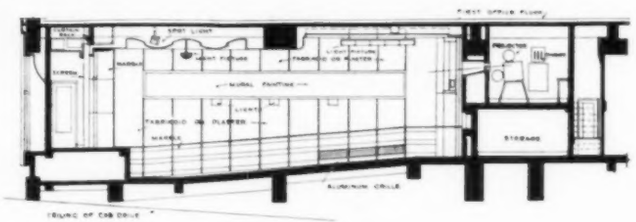
The first floor is arranged so as to offer usual garage accommodations. The bus terminal on this floor has a platform to allow three buses to pull alongside and load at the same time. The restaurant on the ground floor is for hotel patrons and for the public. The parking garage is equipped with a spiral ramp to deliver cars at different floors. The hotel, the garage, the bus terminal and the restaurant may be leased by individuals.

INTERIOR

A NEWS REEL MOVIE IN A RAILROAD STATION

CINCINNATI UNION TERMINAL, CINCINNATI, OHIO

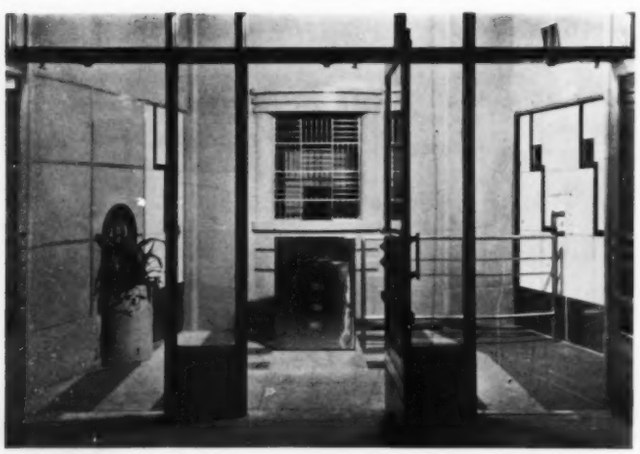
FELLHEIMER AND WAGNER, ARCHITECTS

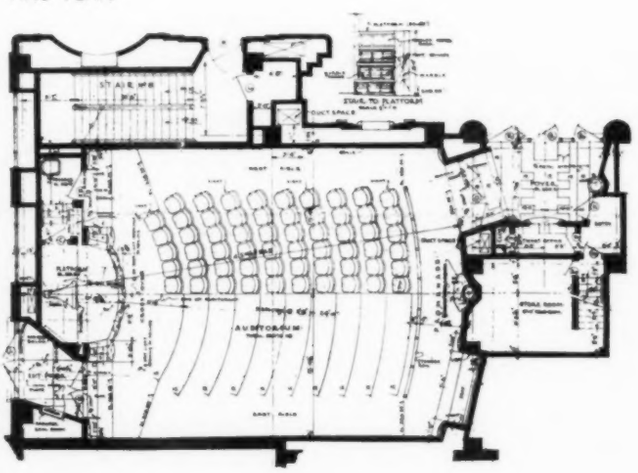


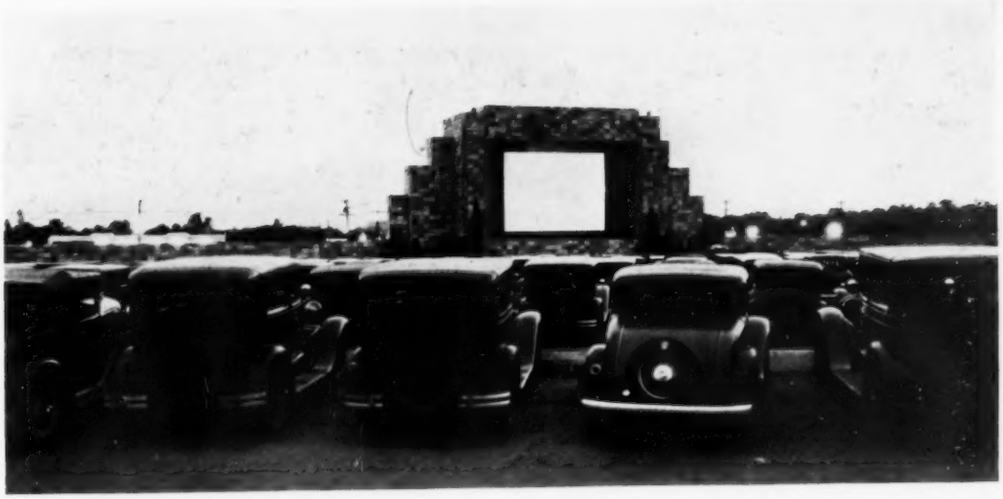
LONGITUDINAL SECTION

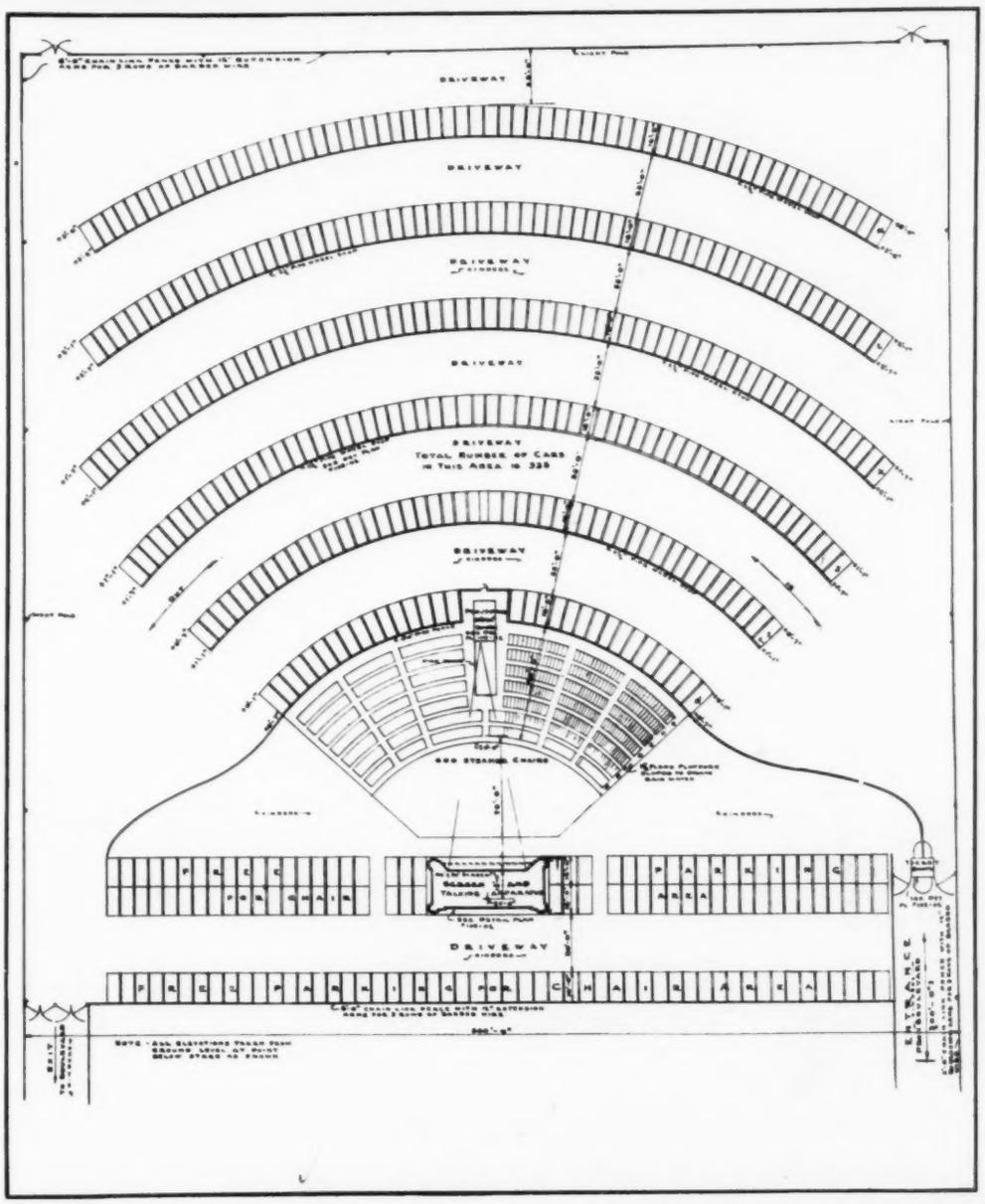
THEATER SECTION AND PLAN

LOBBY





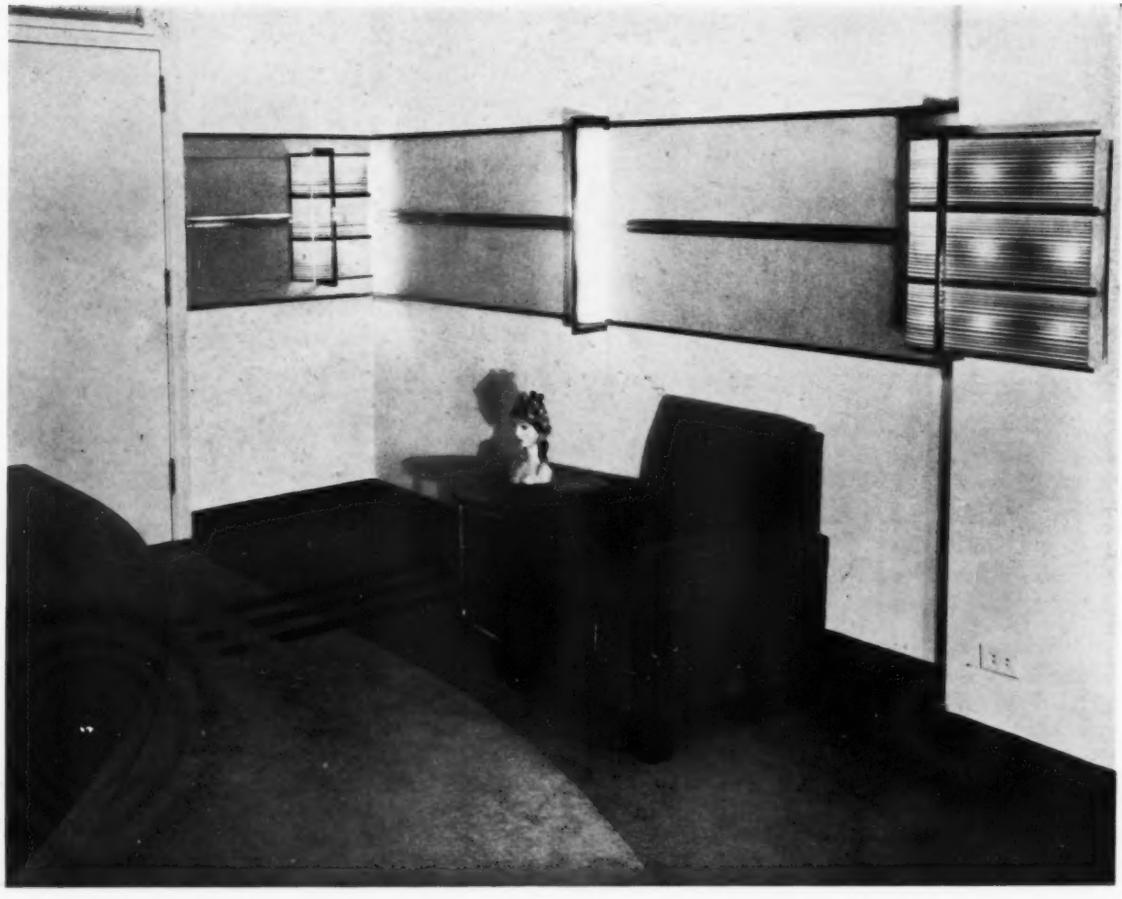


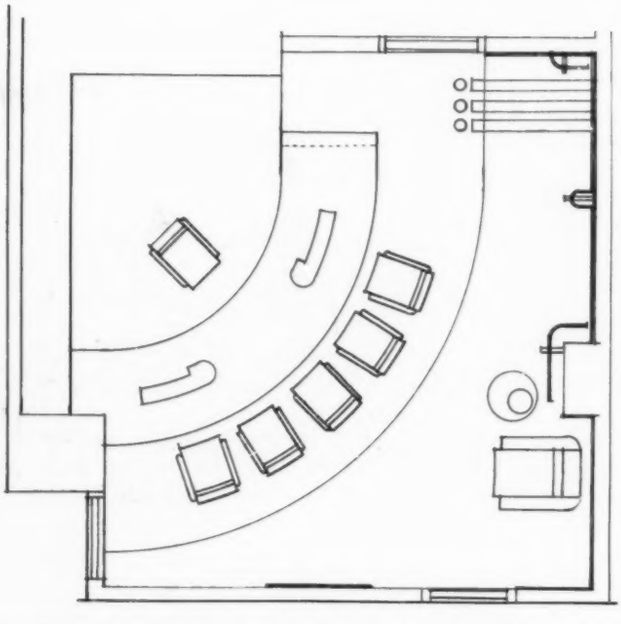


An outdoor theater to which motorists may drive and sit in their parked cars. There is also an area close to screen, with space for 600 steamer chairs, for motorists who park their cars at rear of screen. Cars are parked facing the screen on parking planes that are sloped up toward the screen so as to permit a clear vision of the moving picture.

DRIVE-IN THEATER, CAMDEN, NEW JERSEY

DESIGNED BY R. M. HOLLINGSHEAD, JR.





WALLS—Yellow plaster

RUG—Brick red and gold with some black

LOUNGE CHAIR—Bluish green chenille

CHAIRS AROUND TABLE—Satin brushed chromium covered with vermilion chenille

CABINETS AND SEMI-CIRCULAR DESK—Very light mahogany

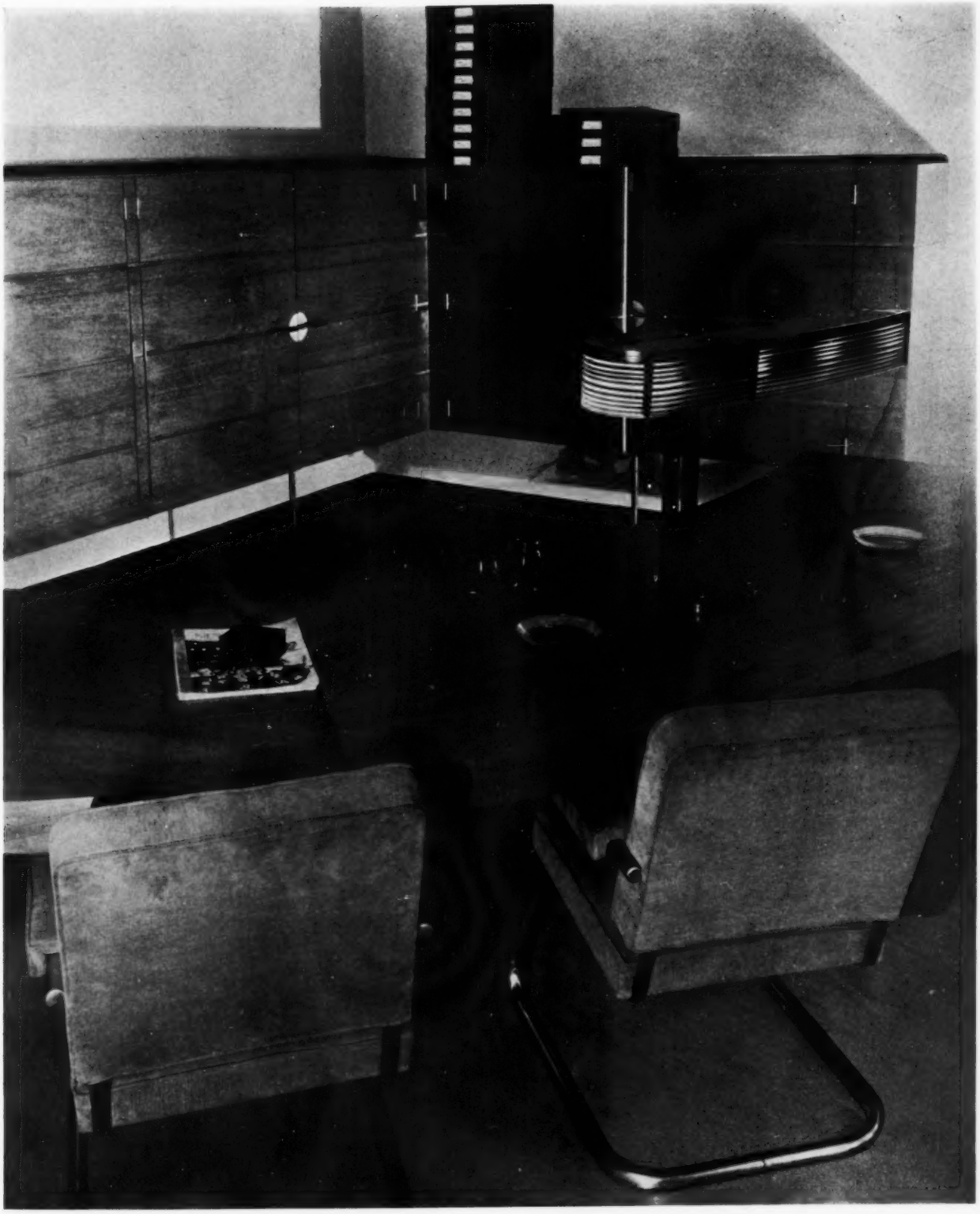
SMALL TABLE—Tubular with mahogany top

DESK LIGHT—Polished black nickel and glass (sand blast white with black lines)

INDIRECT LIGHTING

SHOWROOM FOR REUSS STUDIOS, INC. NEW YORK CITY

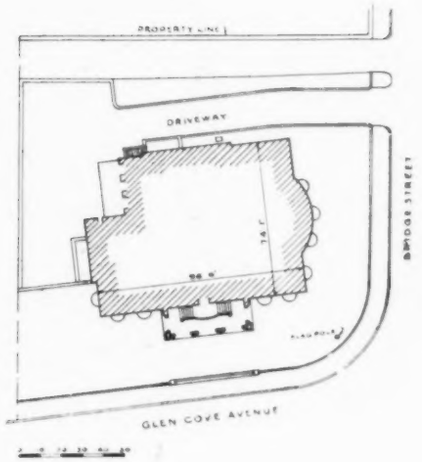
ERNST AUERBACH, DESIGNER



COUNTER AND STORAGE CASES

Wurts Bros.

VIEW OF WORK SPACE



U. S. POST OFFICE AT GLEN COVE, LONG ISLAND

DELANO AND ALDRICH, ARCHITECTS

This building, whose architecture is along the lines of that of the Early Republic, has an arcaded porch with the main floor raised several steps due to existing culverts. The exterior is of red brick and Vermont marble. The paneled public lobby, of a type unusual in post office design, is of American oak. Notable details are the motive of the Caduceus, symbol of Mercury and of commerce, in the capitals, and the form and ornamentation of the window lintels. The planting designed around the building has not yet been done.

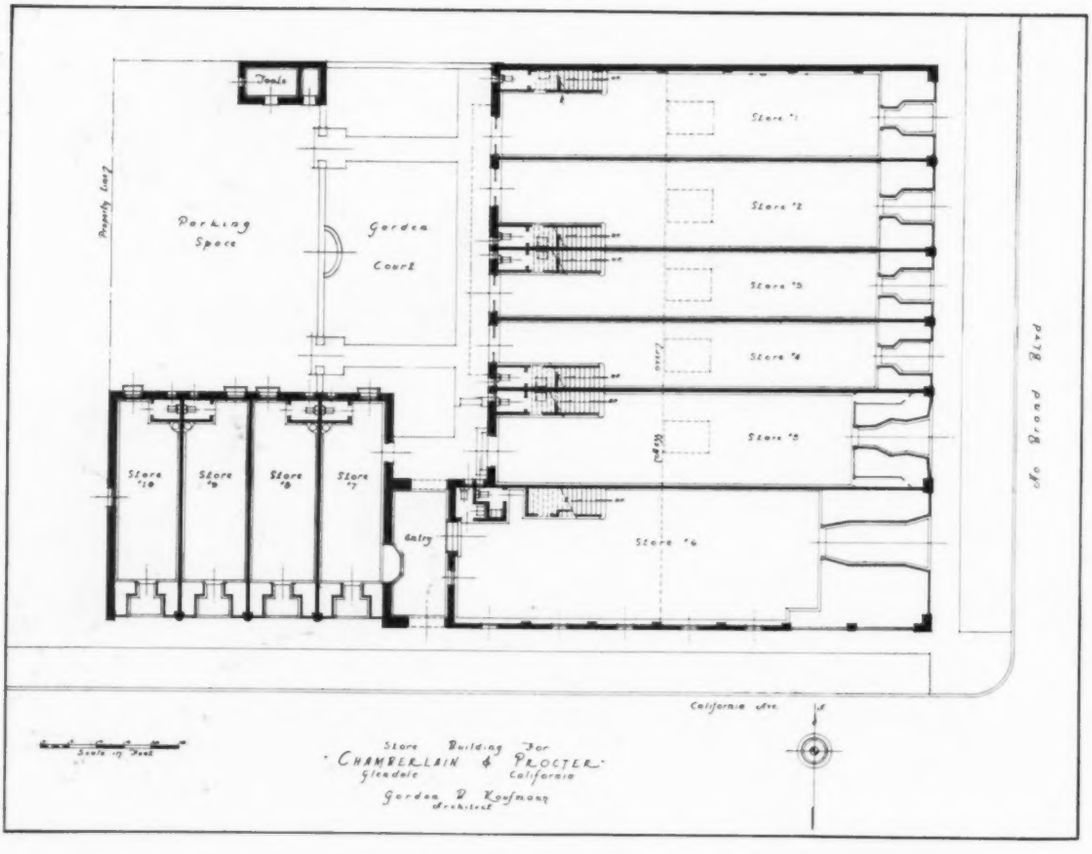
This building forms a part of a proposed group of three buildings making a civic center for Glen Cove. Balancing the Post Office is to be a City Hall, and between the two a circular library, set back behind a garden and connected with the two other buildings by semi-circular walls. This is one of the few instances in which a post office building has been definitely planned as a part of an extensive community development.

ENTRANCE PORCH

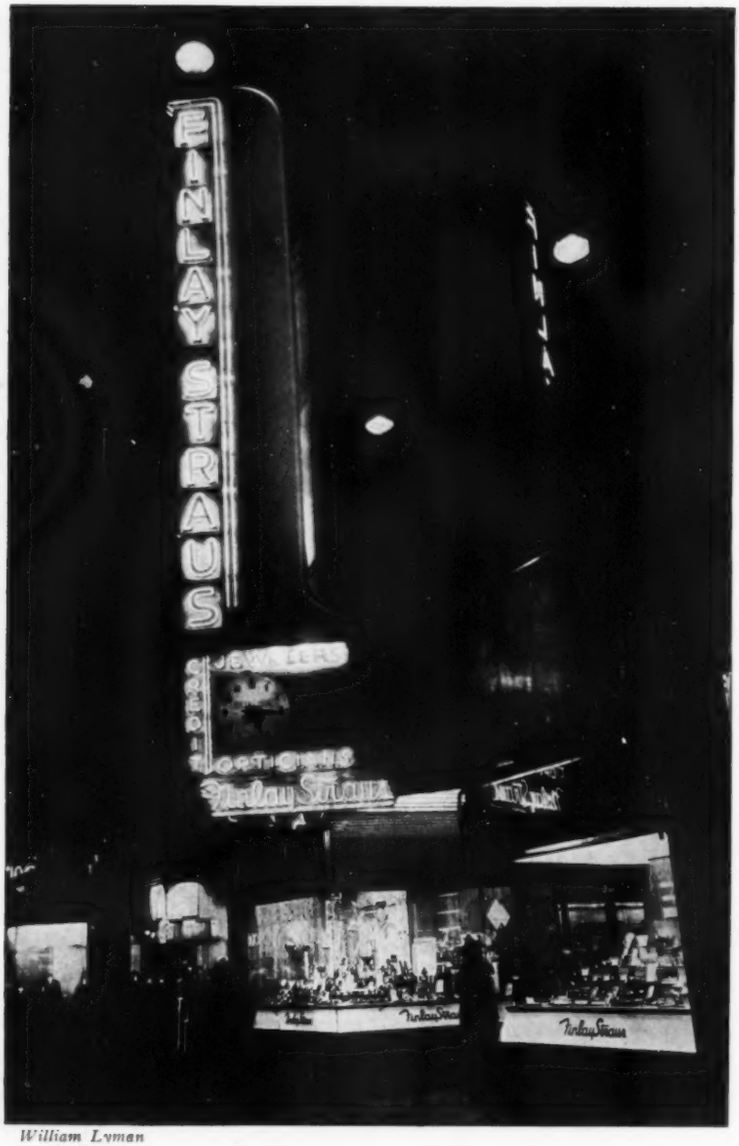
GENERAL VIEW

Wurtz Bros.

KNABE
PICO
SHOES


Property Line
Parking Space
Garden Court
Store "1
Store "2
Store "3
Store "4
Store "5
Store "6
Store "7
Store "8
Store "9
Store "10
Store "11
Store "12
Store "13
Store "14
Store "15
Store "16
Store "17
Store "18
Store "19
Store "20
Store

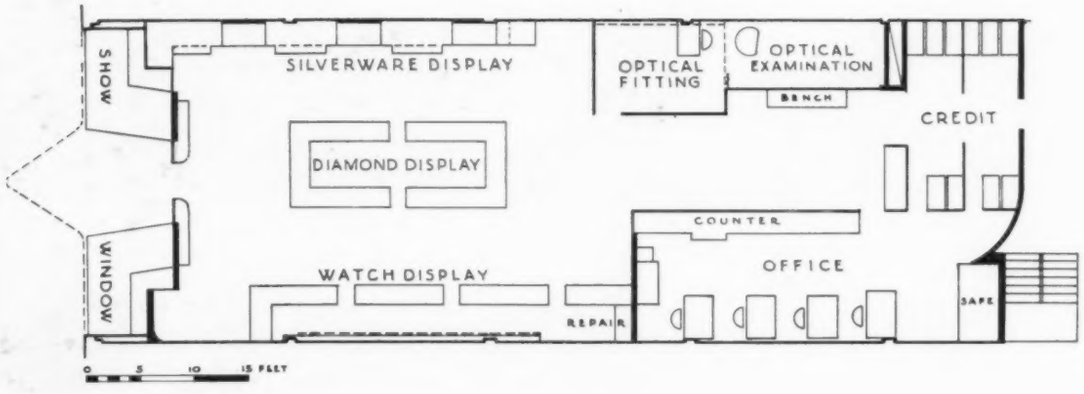
SHOPPING COURT



William Lyman

JEWELRY STORE FOR FINLAY STRAUS NEW YORK CITY

PERCIVAL GOODMAN, INC. ARCHITECTS



WATCH DEPARTMENT

GIFT DEPARTMENT

This company sells jewelry, watches and in addition a variety of household accessories, which are as diverse in type as clocks and electric egg-beaters.

Their plan of merchandising demands not a display of a few carefully selected objects but rather a form of display that will show with some effectiveness a maximum of quantity.

The services necessary for their method of selling are, in addition to the aforementioned display: a series of booths equipped with tables and chairs where the salesmen may take the customer and secure a report on his ability to pay for the object bought. An office provided with a large counter where customers make their weekly payments, take objects to be repaired, make complaints, etc. This office is also pro-

William Lyman

William Lyman

OPTICAL DEPARTMENT

vided with a vault, posting machine, files and several desks for the manager. An optical department, consisting of waiting space, fitting desk, and a dark room equipped for examinations.

The display and selling space divides into three categories; jewelry department, watch department (including repair desk), and household accessory department. The first requires showcases for selling and display, the second showcases and wall cases and the third large wall cases with storage space beneath.

The lighting of such a store as this is very important, especially for the selling of diamonds. To present diamonds effectively it is necessary to have a brilliant glaring light on the merchandise and yet protect the customer's eyes from this glare; at the same time the store as a whole must be pleasantly illuminated and maximum economy in power consumption maintained. This was accomplished by the use of hanging reflectors, the height of the fixture from the floor and

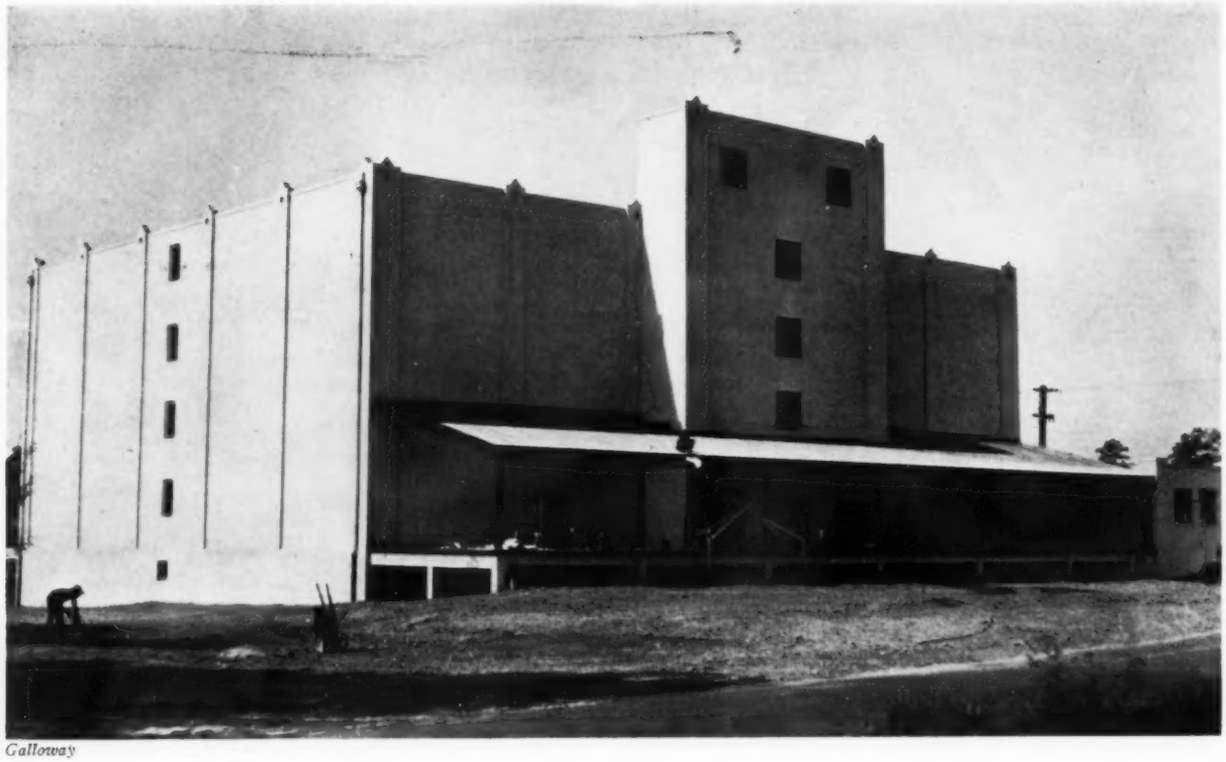
SECTION OF JEWELRY COUNTER

the center of the bulb filament adjusted to provide maximum foot candles on the object displayed. The reflector is of white baked enamel with an exterior shield of aluminum. The bottom of the reflector is covered by a sheet of prismatic glass, which is cut in the center, allowing half of the bulb filament to be entirely exposed. A 300-watt reflector bulb is provided.

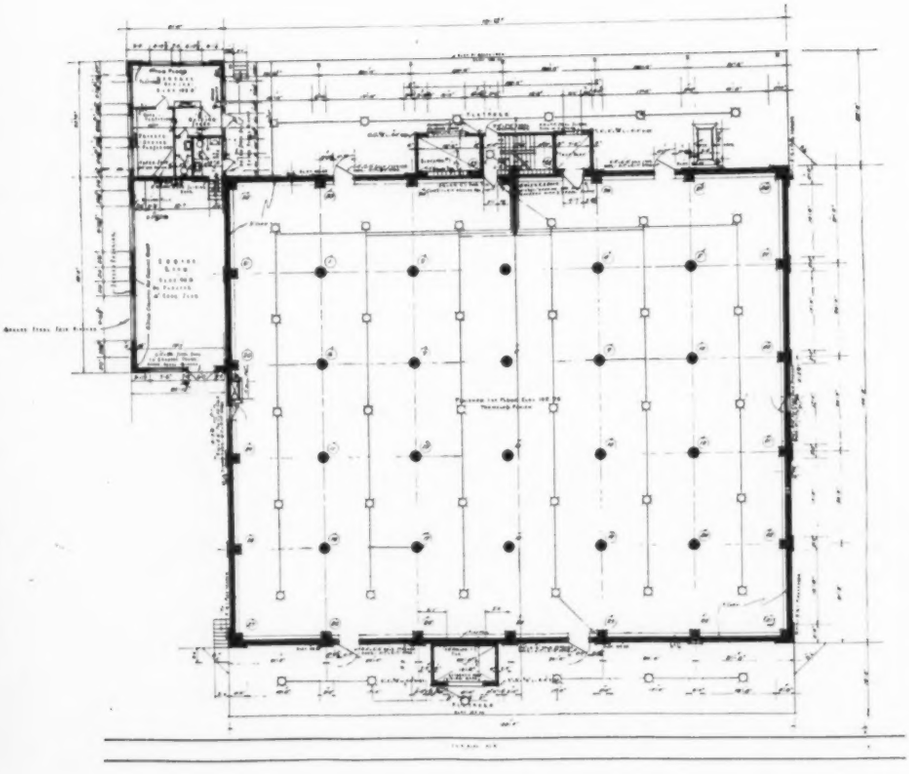
The upper part of the fixture is equipped with a series of exposed, frosted 25-watt bulbs which provide a general ceiling illumination.

The store is ventilated by an intake fan at the rear of the store and two exhausts at the front.

A burglar alarm system is provided.



Galloway



APPLE STORAGE WAREHOUSE
CROZET, VIRGINIA

VAN RENSSELAER H. GREENE, Engineer

LOCATION

*A few years ago, the fruit growers near Crozet, Va., organized the Fruit Growers Association, an organization which assisted in the marketing of their product. The region surrounding Crozet is particularly well situated for the raising of peaches and Albemarle Pippins. Other apples are also grown in this territory, but the Albemarle Pippins predominate. The fruit raising industry has proved so successful in this territory, that each year sees many new orchards planted, and many orchards come into bearing. The apple crop had reached such size in 1928, that it became apparent to the members of the Crozet Fruit Growers Association that a local cold storage warehouse would be necessary in order to secure maximum prices for their products, and to properly preserve their apples until needed in the markets.

THE BUILDING

Accordingly, in the spring of 1929, the Crozet Cold Storage Corporation was organized and plans were gotten under way for a modern cold-storage warehouse capable of holding 60,000 barrels.

The location of the plant is approximately one mile north of Crozet on the Jefferson Highway. Railroad facilities are provided by the Chesapeake & Ohio Railroad.

The main building is a five-story structure with inside measurements 100 feet by 120 feet long, and with ceiling heights 10 feet. This building is of reinforced concrete construction having flat slab floors and reinforced concrete walls.

The plan shows the arrangement of the first floor, and this first-floor arrangement of the main building is the same for all floors. On the front of the railroad side there is a covered platform 15 feet wide with an elevator serving all floors. On the front of the building there is a covered platform 25 feet wide with an elevator stairway and a barrel hoist. A chute is also provided from the platform to the basement which is used for chuting baskets of apples into the basement.

The engine room and office occupy a structure approximately 21 feet by 67 feet long at one corner of the building. The arrangement is indicated on plan.

WALL CONSTRUCTION

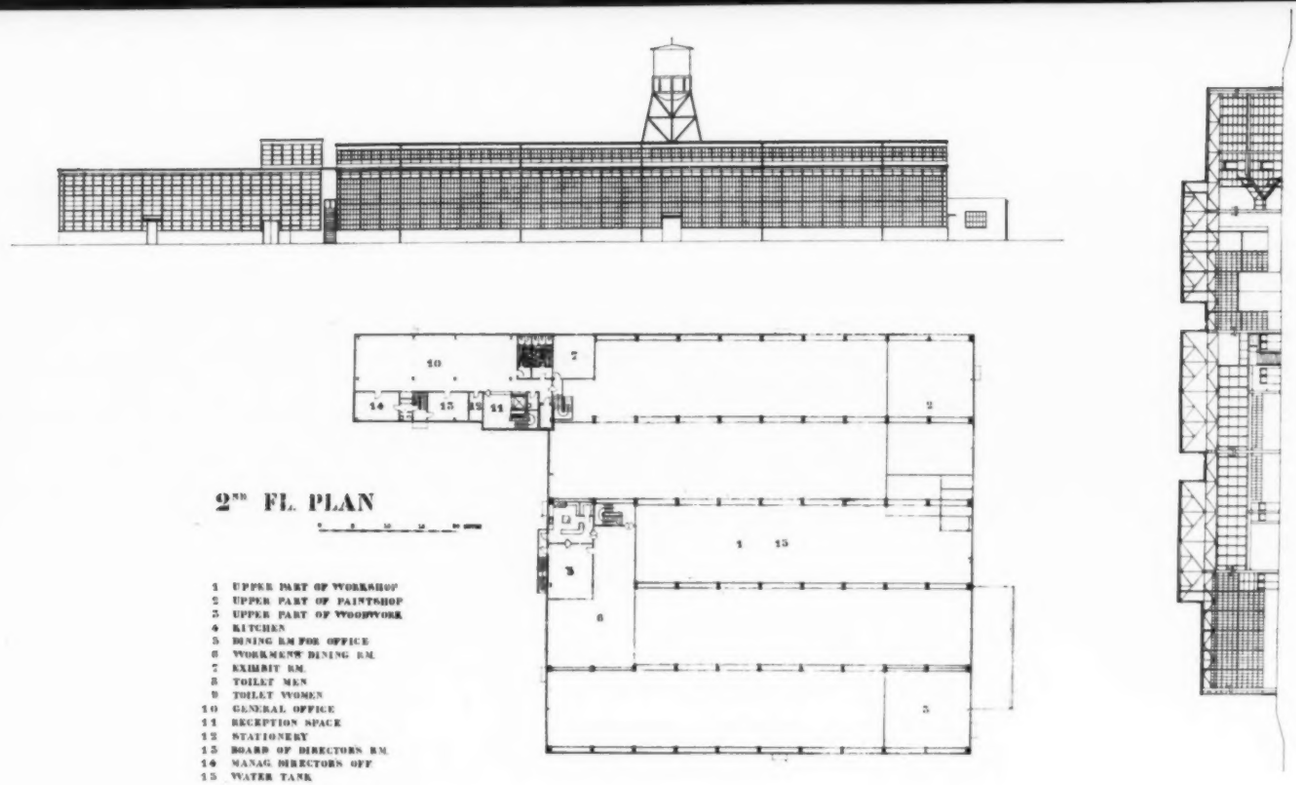
The walls are of reinforced concrete construction. The method of constructing these walls is of particular interest to the cold-storage industry. The walls are only 6 inches in thickness but are thoroughly reinforced to withstand any wind pressure. The pilasters are securely anchored to the building columns at each floor level with heavy galvanized iron rods.

The walls were constructed by the use of a patented sliding form of the MacDonald Spencer Engineering Company, Inc., of New York City. By the use of these patented forms, it was possible to pour over 8 feet of wall work per day, and the resulting wall was a smooth even surface inside and out, with true corners and pilasters. The wall is waterproof and windproof, a construction much desired in the cold-storage industry. One advantage of this type of construction for cold-storage work is the fact that no plastering of the walls is necessary before insulation is applied, nor is any outside finish needed other than a cold water paint.

INSULATION

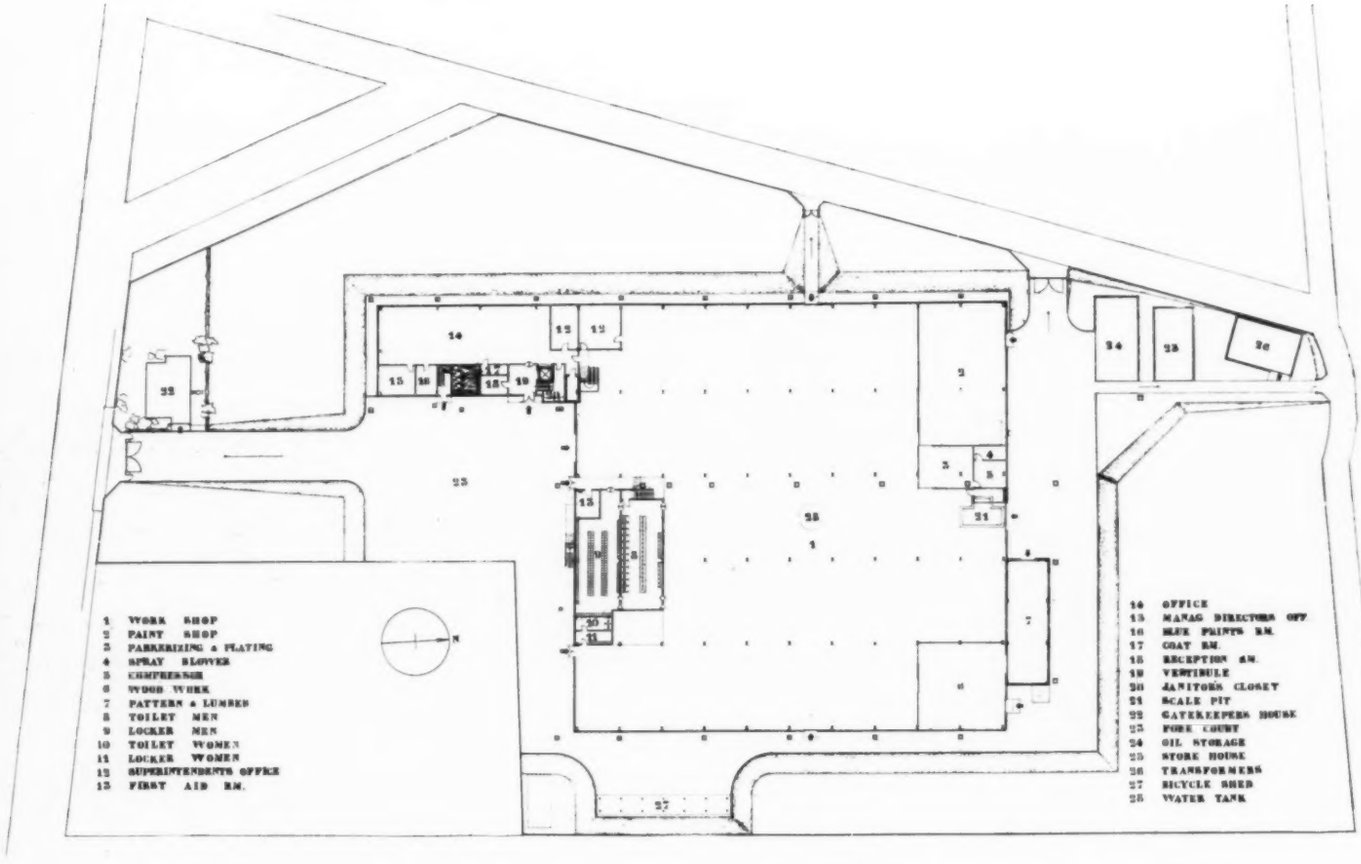
The insulation consisted of one layer of 3-inch corkboard on the basement floor and all walls, and two layers of 2-inch corkboard on the roof of the building. All insulation was set up in hot asphalt. The finish over the insulation on the walls is of particular interest. It is a mastic finish which is different, and which is said to be an improvement over most of the mastic finishes now in use. The finish is 1/4 inch in thickness, is very hard, does not crack, and is moisture-proof. The color is much more pleasing than the old-style mastic finishes.

*From *Ice and Refrigeration*



2ND FL. PLAN

1 UPPER PART OF WORKSHOP
2 UPPER PART OF PAINTSHOP
3 UPPER PART OF WOODWORK
4 KITCHEN
5 DINING RM FOR OFFICE
6 WORKMEN'S DINING RM.
7 EXHIBIT RM.
8 TOILET MEN
9 TOILET WOMEN
10 GENERAL OFFICE
11 RECEPTION SPACE
12 STATIONERY
13 BOARD OF DIRECTORS RM.
14 MANAG. DIRECTORS OFF.
15 WATER TANK



1 WORK SHOP
2 PAINT SHOP
3 PARKERIZING & PLATING
4 SPRAY BLOWER
5 COMPRESSOR
6 WOOD WORK
7 PATTERN & LUMBER
8 TOILET MEN
9 LOCKER MEN
10 TOILET WOMEN
11 LOCKER WOMEN
12 SUPERINTENDENTS OFFICE
13 FIRST AID RM.

14 OFFICE
15 MANAG. DIRECTORS OFF
16 BLUE PRINTS RM.
17 COAT RM.
18 RECEPTION RM.
19 VESTIBULE
20 JANITORS CLOSET
21 SCALE PIT
22 GATEKEEPERS HOUSE
23 FORE COURT
24 OIL STORAGE
25 STORE HOUSE
26 TRANSFORMERS
27 BICYCLE SHED
28 WATER TANK

1ST FL. PLAN

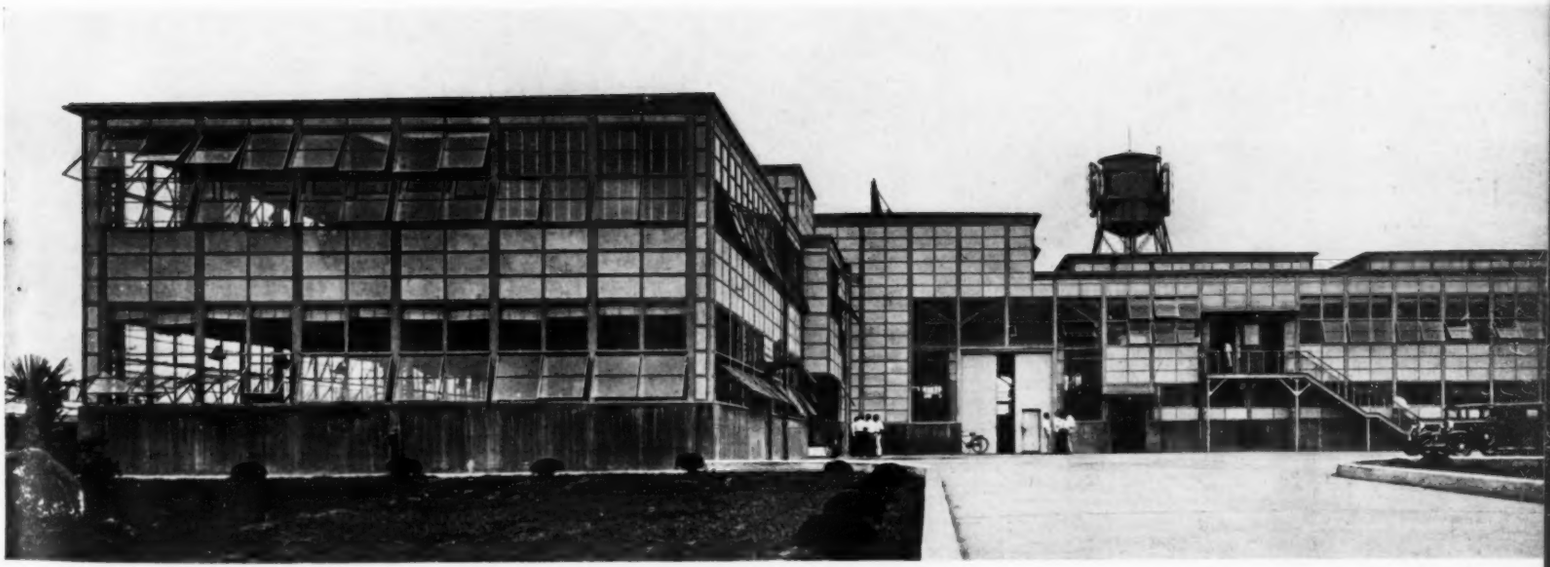
FACTORY BUILDING FOR THE OTIS ELEVATOR COMPANY, TOKYO, JAPAN

ANTONIN RAYMOND, ARCHITECT

WEST ELEVATION

FACTORY BUILDING FOR THE OTIS ELEVATOR COMPANY, TOKYO, JAPAN

ANTONIN RAYMOND, ARCHITECT

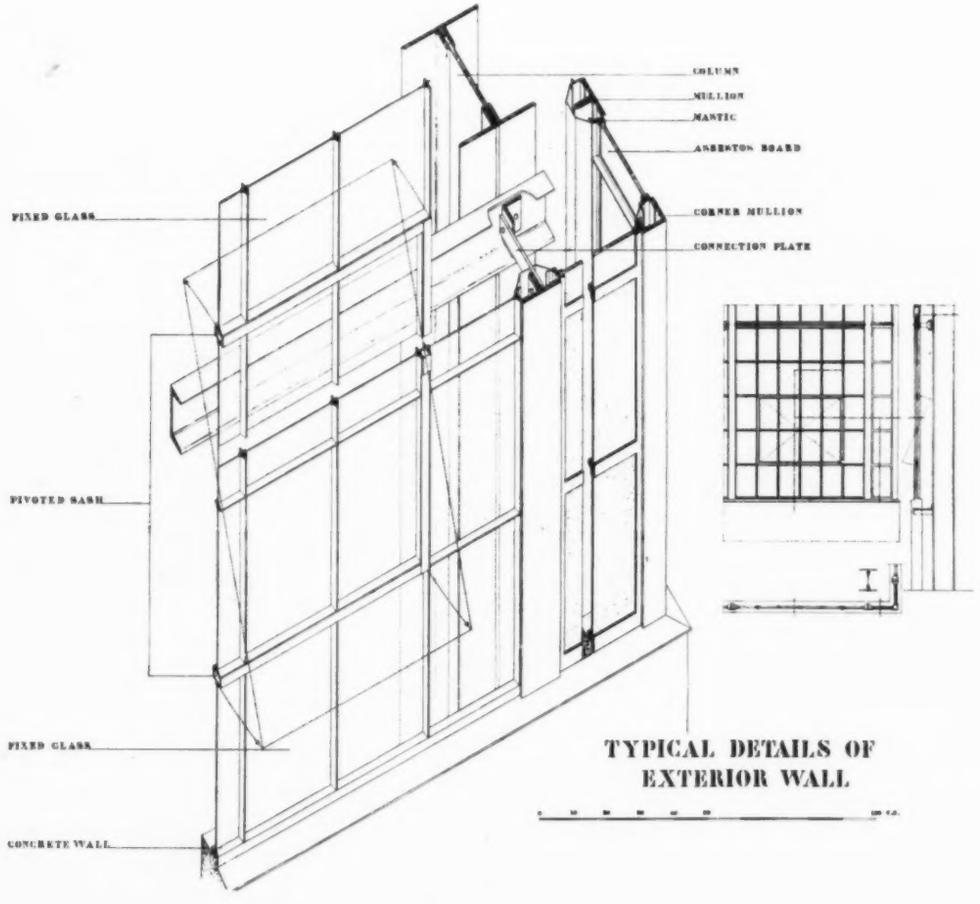


SOUTH ELEVATION AND MAIN ENTRANCE

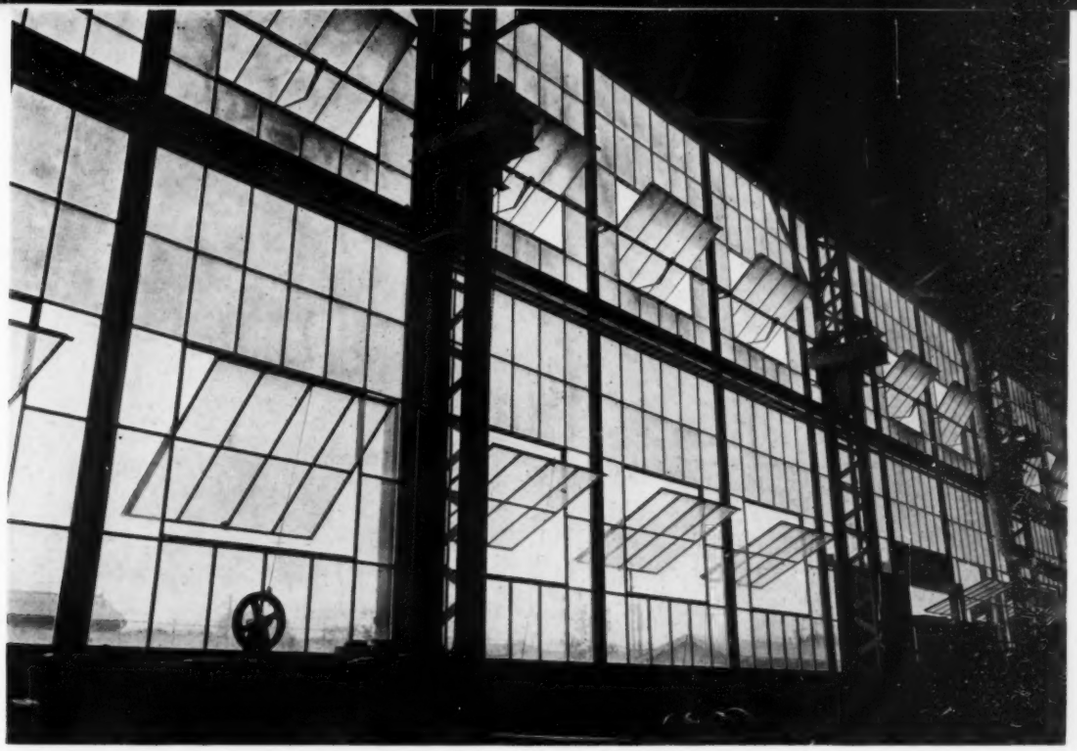
WEST WALL

OTIS ELEVATOR FACTORY, TOKYO, JAPAN

ANTONIN RAYMOND, ARCHITECT



TYPICAL DETAILS OF EXTERIOR WALL



INTERIOR
PLANT VIEWS

VIEW FROM POOL

EMBASSY BUILDING

GROUND FLOOR

1. Vestibule
2. Hall
3. Attendant
4. Waiting Room
5. Office
6. Files

FIRST FLOOR

1. Hall
2. Secretary
3. Office
4. Office of the Ambassador
5. Attendant

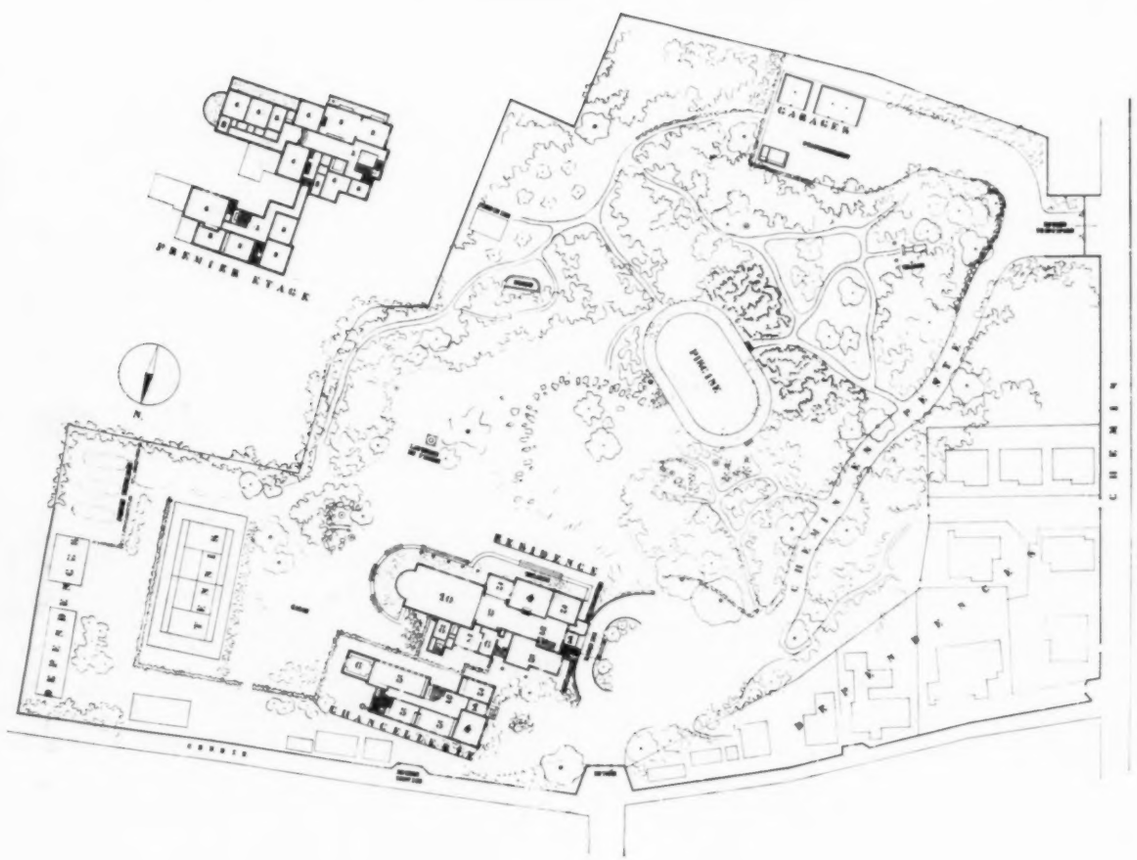
RESIDENCE

GROUND FLOOR

1. Vestibule
2. Hall
3. Salon
4. Grand Salon
5. Dining Room
6. Office
7. Kitchen
8. Servants
9. Foyer
10. Great Room

FIRST FLOOR

1. Hall
2. Smoking Room
3. Salon
4. Bedroom
5. Bathroom
6. Linen

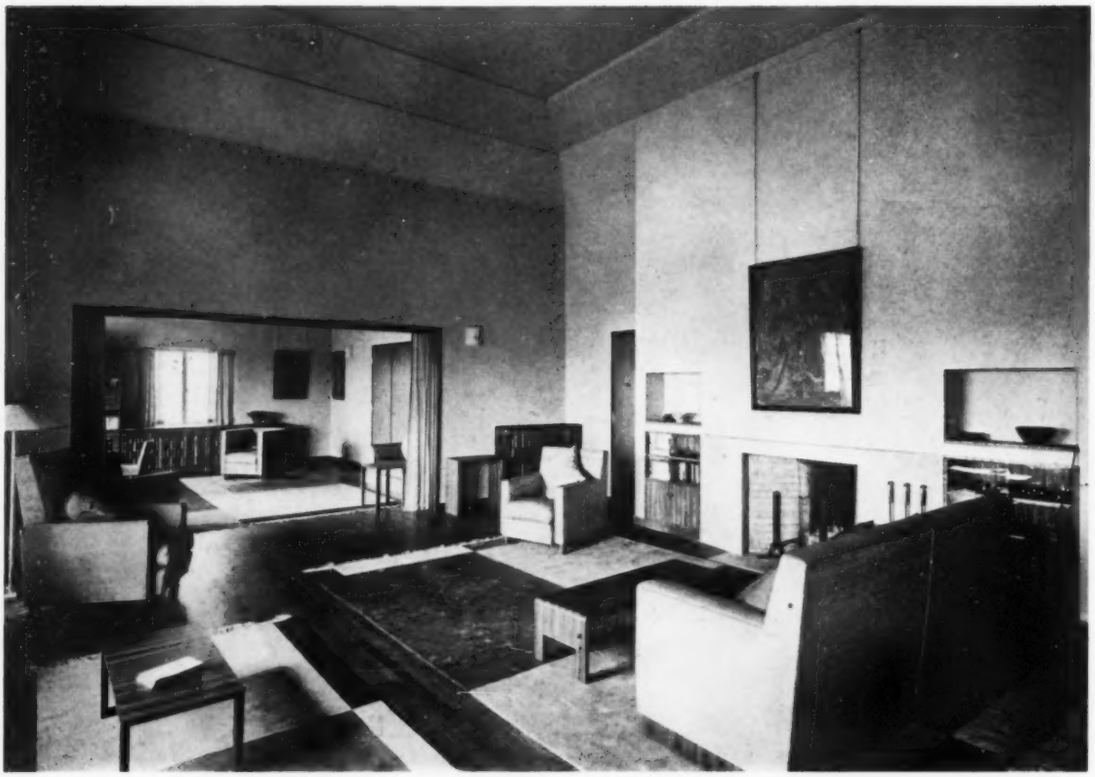


FRENCH EMBASSY, TOKYO, JAPAN

ANTONIN RAYMOND, ARCHITECT

THE TERRACE

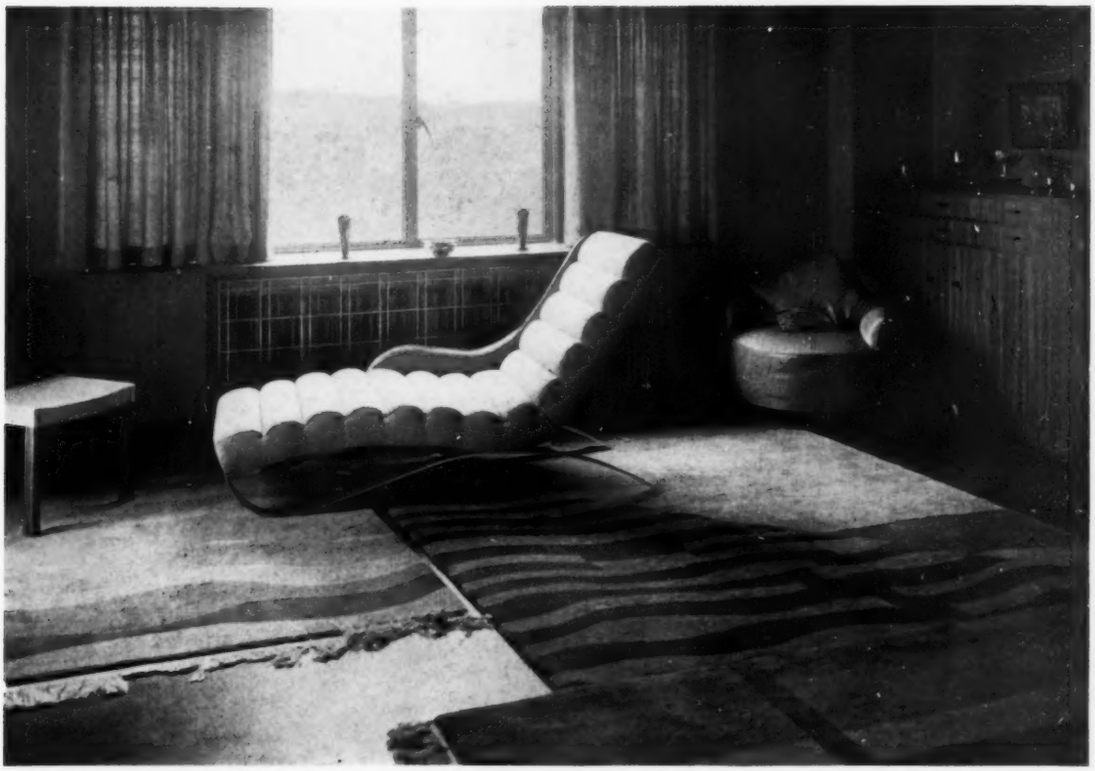
FRENCH EMBASSY, TOKYO, JAPAN



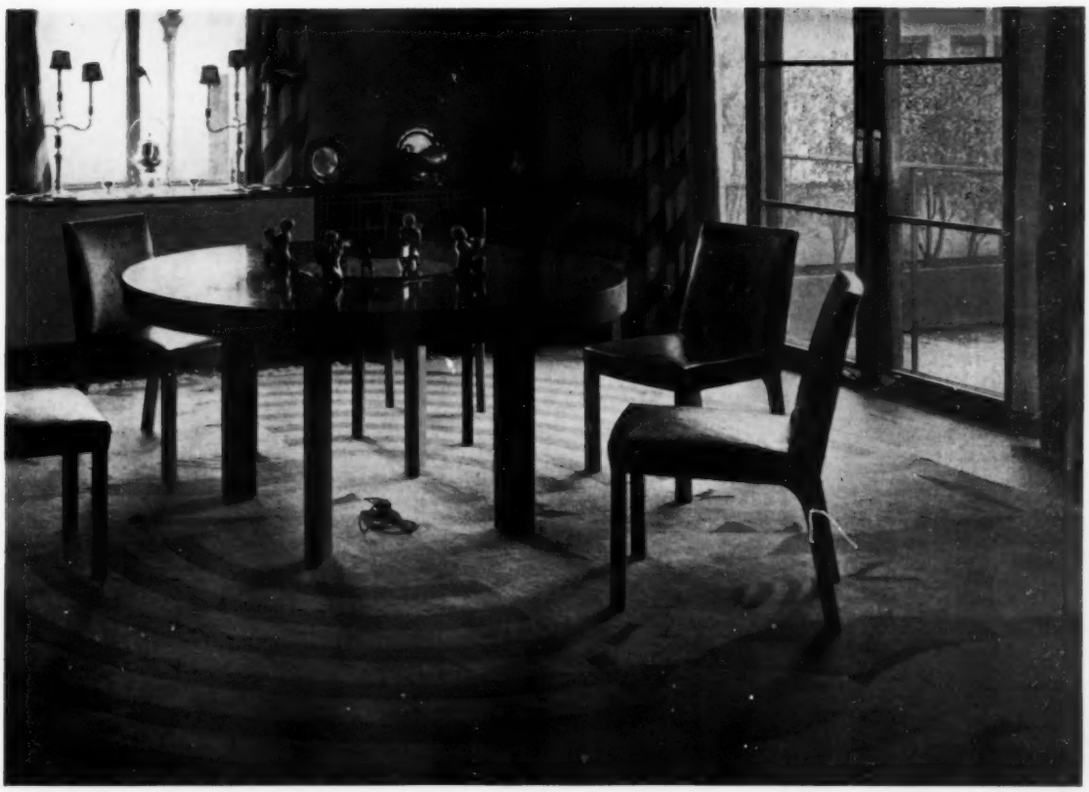
SECOND FLOOR LIVING ROOM VIEWS

WALLS, CEILING, FURNITURE, CURTAINS, SAND COLOR, CUSHIONS AND RUGS SAND, VIOLET, COPPER, BLACK AND TOBACCO.

ANTONIN RAYMOND, ARCHITECT



BEDROOM



BREAKFAST ROOM ON SECOND FLOOR

GREEN, WHITE AND ULTRAMARINE.

A SERVICE STATION, YOKOHAMA, JAPAN

ANTONIN RAYMOND, ARCHITECT

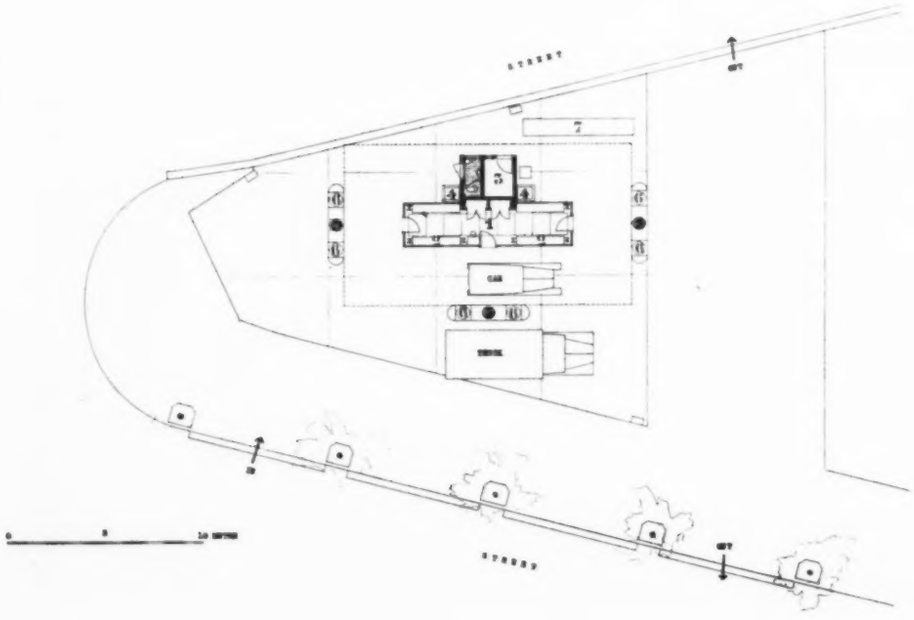
COLORS:

BLACK

RED

YELLOW

WHITE



PLAN:

OFFICE 1

SHOW WINDOW 2

STORAGE 3

SAND-BOX 4

PUMP 5

OIL 6

HOIST 7

A SERVICE STATION, TOKYO, JAPAN

ANTONIN RAYMOND, ARCHITECT

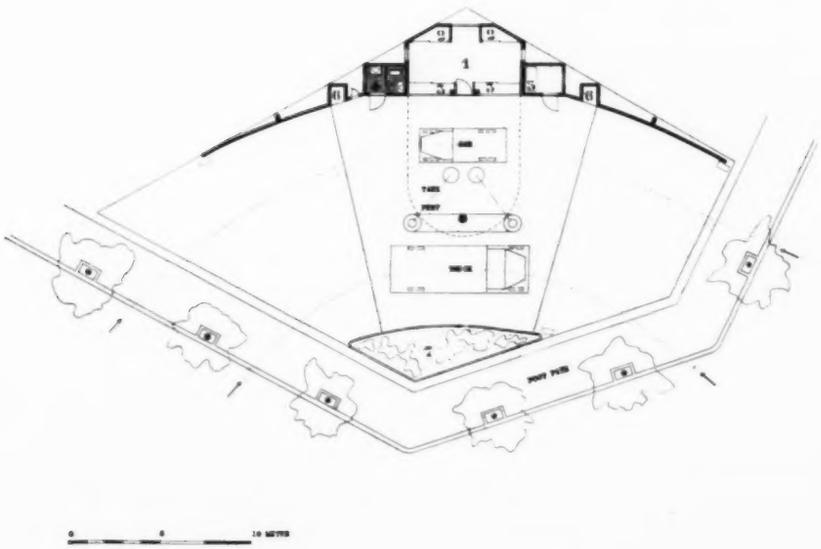
COLORS:

BLACK

RED

YELLOW

WHITE



PLAN:

OFFICE 1

CLOSET 2

SHOW WINDOW 3

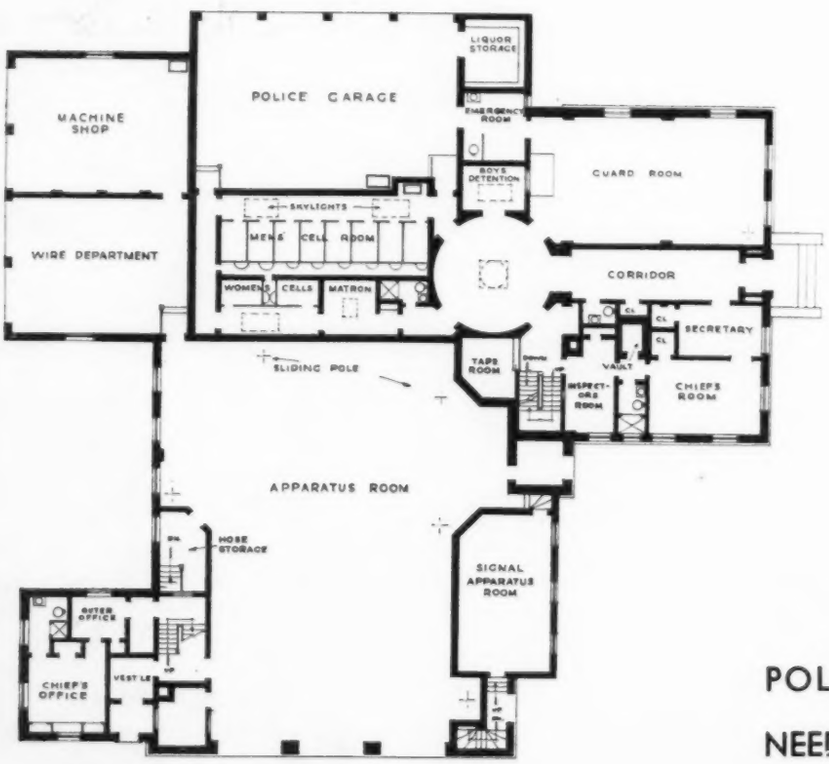
TOILET 4

AIR COMPRESSOR 5

SAND-BOX 6

TURF 7

SECOND FLOOR PLAN



FIRST FLOOR PLAN

POLICE AND FIRE STATION, NEEDHAM, MASSACHUSETTS

GEORGE ERNEST ROBINSON, ARCHITECT

Paul J. Weber

GENERAL EXTERIOR, VIEW TOWARD ENTRANCE

In general it is desirable to have the fire station, police station and the fire-alarm system building in different locations as they all function differently. The smallest towns have these housed usually in their town building.

In towns with population ranging from six thousand up to thirty-five thousand, we have a problem such as is shown for the Town of Needham, Massachusetts. This town has assembled the three units on one lot of land, each building adjoining the other but having practically no connection. This insures to the firemen and policemen buildings which are on different streets.

The fire alarm requires an equipment separate from any telephone system, with boxes located on streets of the city. Ten boxes serve the average circuit but an overloaded circuit, in an emergency, can take twenty boxes per circuit. Separate batteries, placed in a different room from the high-priced fire-alarm system, take care of the system. If all the local electric light companies should be out of order, the fire alarm still operates satisfactorily.

One of the best known call-systems of whistles is the Lebaron which is comprised of air tanks, one to three in number, about ten feet long and four feet in diameter.

DETAIL, MAIN ENTRANCE

Whistle-machinery which looks like a lathe is placed at a point near the whistle and must be kept free from frost. Battery racks, usually five to seven feet long, are made up in units which go into the battery room. The repeater should be in the middle of the alarm room and the instrument itself from two to three and a half feet long and incased in glass. The relay board varies as to use and is usually made of slate.

The fire-alarm building, which is marked "signal apparatus room" on the accompanying plan, shows the approximate size for a town of about twenty-five thousand people. This allows for growth which is necessary in laying out a building of this nature.

THE FIRE STATION

The Town of Needham has a permanent fire-fighting force. Its building is laid out for approximately twenty-five men, as a maximum, and there are at present twelve to fifteen men on duty. The average apparatus room will house a one-thousand gallon pumper which is about twenty-six feet long; one hose wagon which is approximately twenty-two feet long; one chemical apparatus about twenty-four feet long; one ladder which is nearly forty-five feet long. Some of

Paul J. Weber

FIRE DEPARTMENT BUILDING

the other apparatus used in a fully-equipped fire department are: an emergency wagon, boat facilities for use on ponds, lakes and rivers, and brushwagon to be used in fighting brush fires.

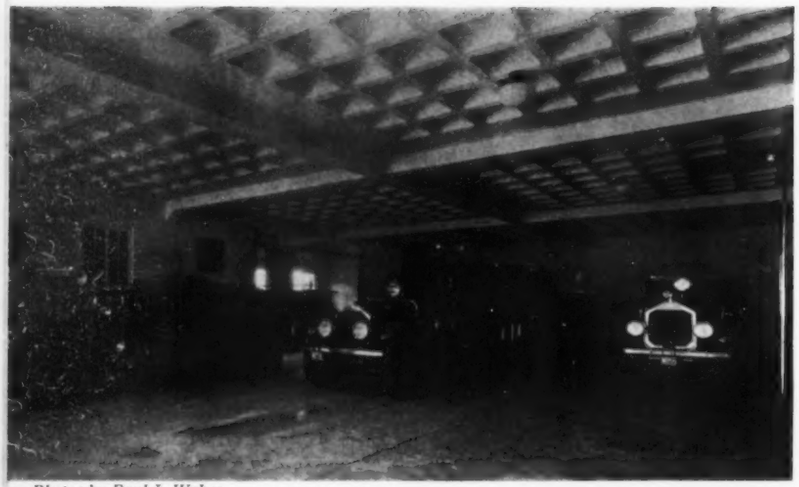
It is not uncommon to lay three to five thousand feet of hose at a fire and this must later be dried. Some firemen believe the hose should be hung in a tower and allowed to drip. Others believe it should be hung over a large roller while some believe a pitched rack should be used for drying the hose. As hose comes in multiples of fifty feet, the architect can arrange for drying in planning his building.

Fire extinguishers have come into use in many buildings and homes and many departments use vitriol for the re-charging of the extinguishers. It is imperative that the acid be kept in a separate place as it is the enemy of the hose.

In entering a fire station one must first approach a watchroom.

The office for the Chief includes shower bath, toilets, closets and vaults and should be on a different floor from his sleeping accommodations, if such are provided for him.

Regarding sleeping accommodations, officers should have their own rooms and bath accommodations. The men should have what is known as "bunk" rooms, each accommodating from four to ten men. If the two platoon system



Photos by Paul J. Weber

INTERIOR APPARATUS ROOM

RECREATION ROOM

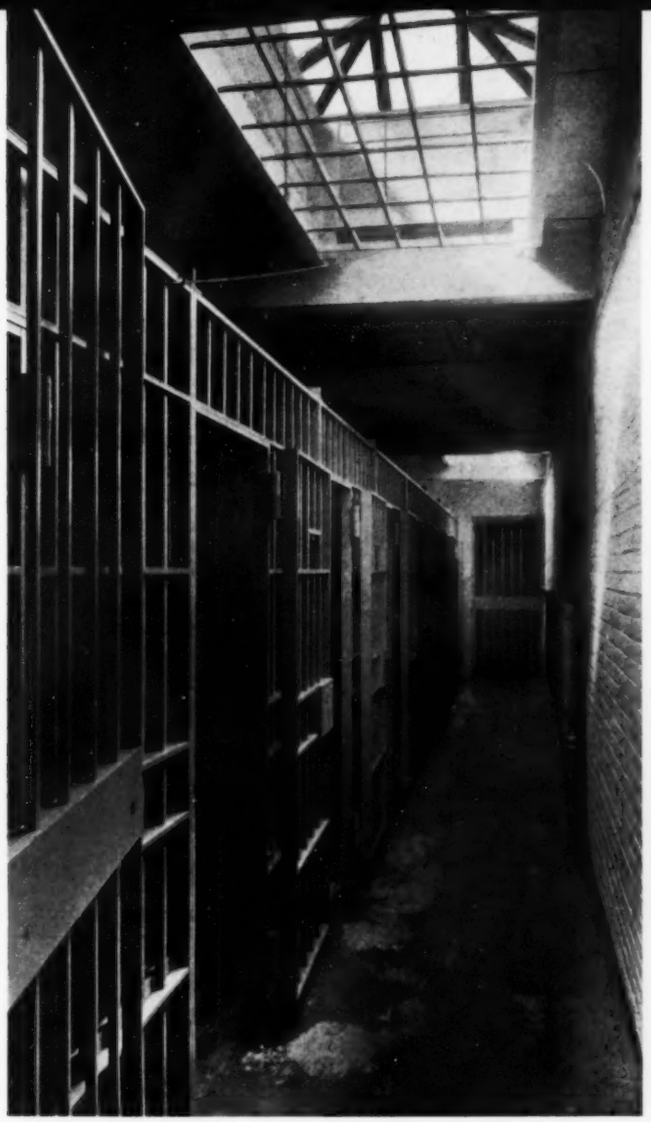
is used, every man should have his own bed. The locker rooms should be adjacent to the bunk rooms; and also the boot room which is for the night quick-hitch. The firemen should also have ample recreation rooms.

The sliding poles should never be in the middle of the floor where the apparatus is kept but should run as near as possible to the sides or front of the apparatus. Poles are apt to be knocked over when apparatus is backed in. It might be added that a fire station with posts between the apparatus is antiquated and unsatisfactory. Often men have been injured by posts while running to get to their apparatus in minimum time.

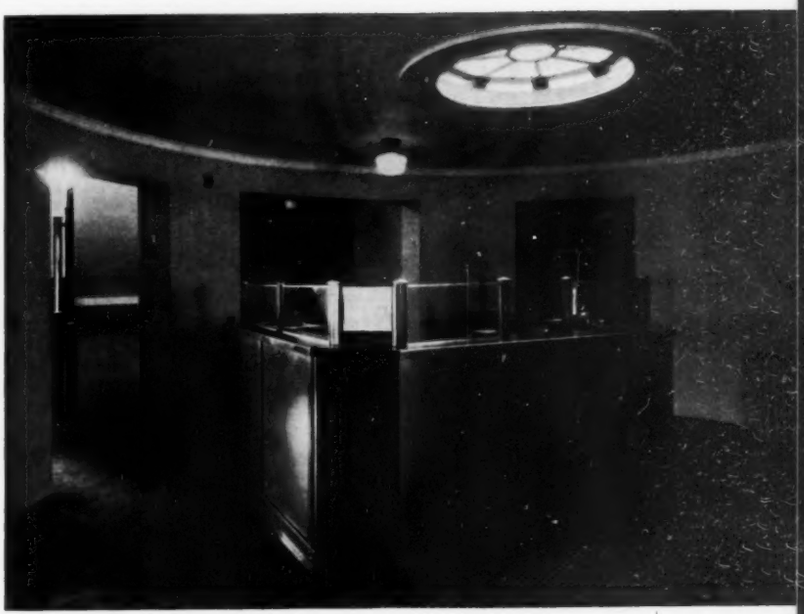
The water supply of a city or town is so closely allied with the fire department that an architect must give it serious consideration in making his plans.

THE POLICE STATION

The police station at Needham, as shown on the plan, is laid out according to the number of cells required by the town. In other words, the number of cells determines almost entirely many of the requirements of the police department. This station functions from the center. The rotunda gives the man in control a full view of the station. The



CELL ROOM AND
HEARING AND CONTROL ROOM

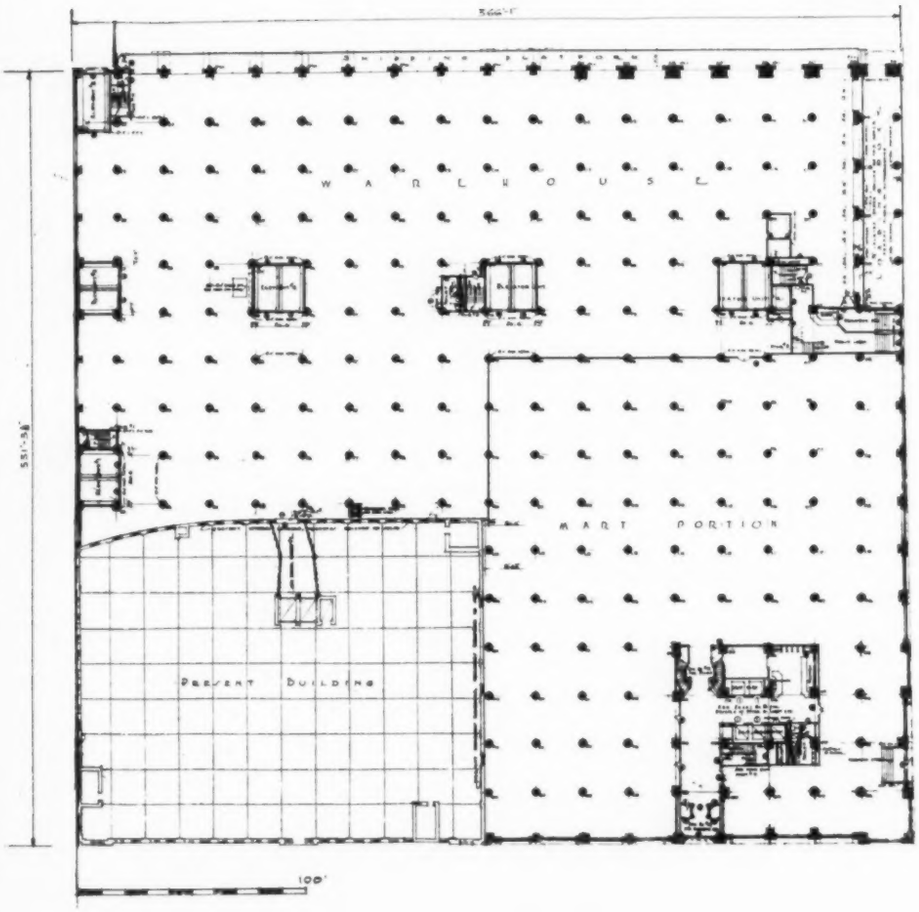


booking-desk gives him opportunity to read his teletape on duty, to book his customers, and to note when his men come in and go out. He has control over the boys' detention room, the laws of Massachusetts stating boys cannot be held in a cell.

There must be an inspector's room for fingerprinting and examinations. An emergency room is necessary (and in this case the emergency room is especially well equipped); likewise, a guard room where the officers hold their activities and receive instructions.

In the basement it is desirable to have a rifle range and also place for lost and stolen articles. In a station of this size a matron is not always on hand, but it is required by law that a matron be in a station where there is a woman prisoner. She must have a separate room and toilet accommodations.

On the second floor of the police station there is an officers' room where daily reports can be made out, also bedrooms where the men can stay in cases of emergency; a kitchen where they can eat their meals and a common room. A sliding pole goes through the second floor common room to the guard room on the first floor, an innovation in police station design.



GROUND FLOOR

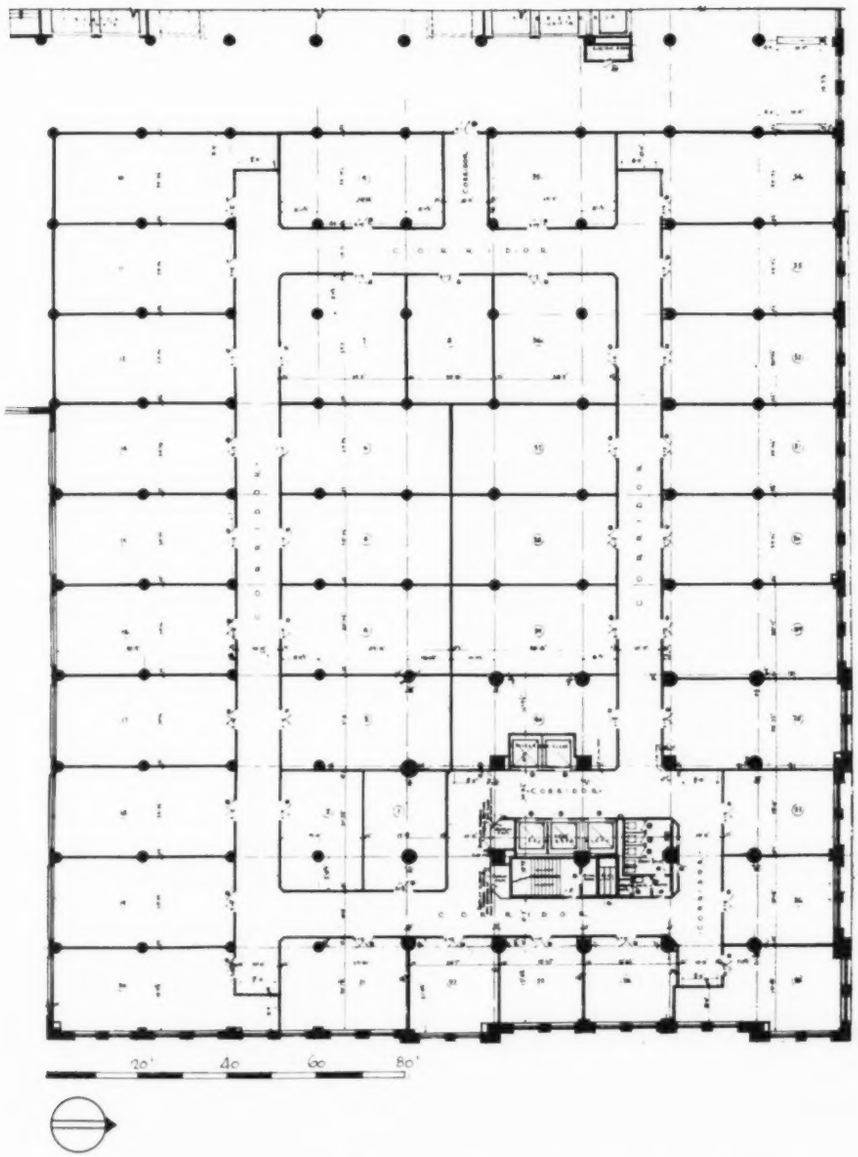
MERCHANDISE MART, ST. LOUIS, MISSOURI

PRESTON J. BRADSHAW, ARCHITECT

An office building for merchandise display and sales. The Mart Building covers an entire city block. This building, new in type, provides under one roof the following accommodations:

—Complete modern sales offices
—Permanent exhibitions of merchandise
—Warehousing facilities
—Every form of distributing service
—Sales marts
—Club rooms occupying two floors with every convenience that the business men's club affords
—Auditoriums
—Meeting rooms for sales conferences
—Studios of KMOX—one of the broadcasting stations of the Columbia chain

The Mart sections (see plans) are divided into large salesrooms with plate glass display windows facing wide corridors. This assumes the character of an arcade of merchandise displays.



TYPICAL MART PLAN

Offices in the tower of the building have latest-type equipment. The corridor partitions are of tapestry obscure glass. The floors are of tile with a terra cotta wainscot. Five high-speed, self-leveling passenger elevators afford lift service from the first to the top floors in twenty-one seconds without stop, while nine well-distributed freight elevators serve the Mart and Industrial sections.

The main *auditorium*, having a seating capacity of 500 people, immediately adjoins the radio broadcasting station. In connection is a special kitchen which is employed when the auditorium seating is cleared and the room used as a banquet hall.

WAREHOUSE FEATURES:

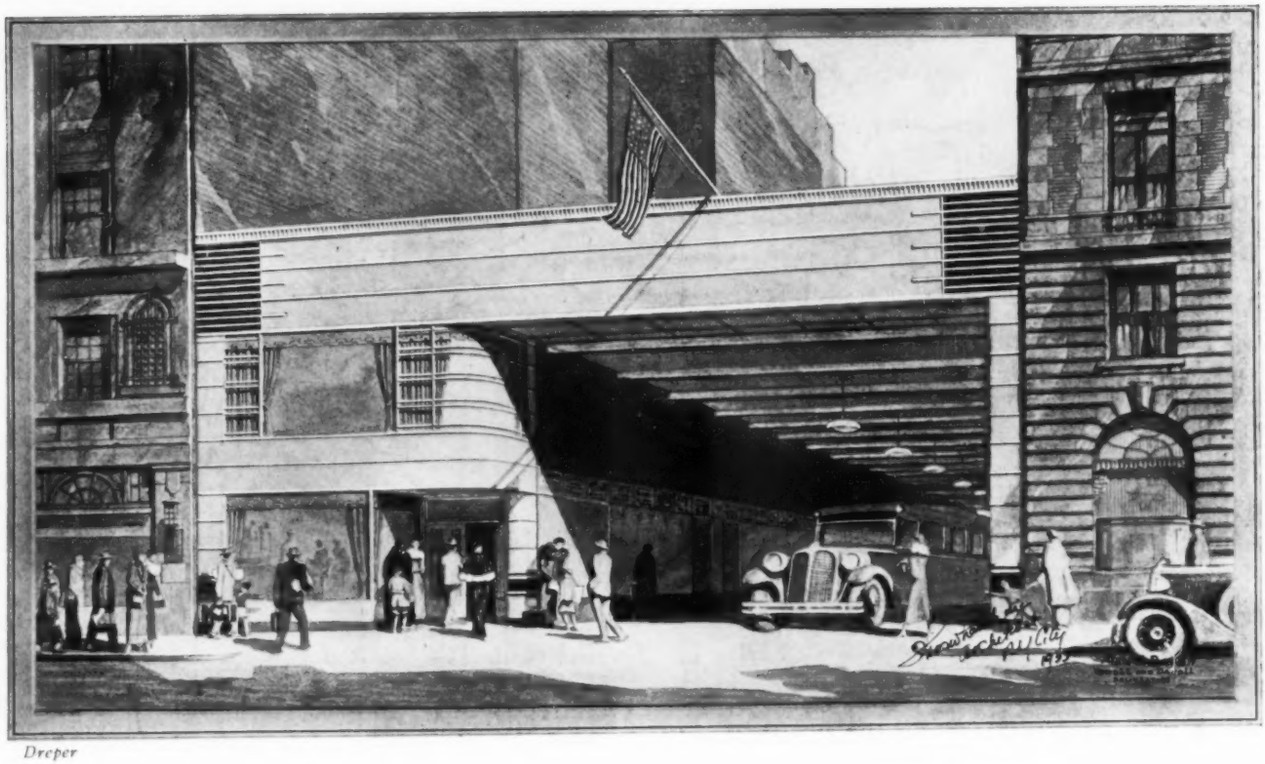
FLOORS—AREA AND LIVE LOAD: Each floor affords approximately 100,000 square feet of area—sufficient to handle almost any amount of storage on one floor is desired. The heavy construction of the building permits live floor loads of 250 pounds per square foot.

CEILING HEIGHTS: Ceiling heights are ample, being 11'6" on the ground floor, 12'3" on the first floor, and 10'9" on the other floors, measurements being taken from floor line to ceiling. The warehouse is protected with sprinkler systems.

ELEVATORS: Eight heavy-duty elevators with 9 x 17-foot platforms, having a capacity of 10,000 pounds each, serve the warehouse. An additional elevator with a 10 x 24-foot platform and a capacity of 18,000 pounds is so located that a large truck may be driven on to it and carried to any industrial floor for loading or unloading.

TRUCK DOCKS: Covered truck docks on Spruce Street and the full length of Thirteenth Street have a capacity of fifty trucks at one time.

RAILROAD DOCKS: Private railroad sidings adjoin covered freight docks the entire length of the south side of the building, at which 30 cars can be spotted. This provides ample capacity for 100 cars inbound and 100 cars outbound daily.



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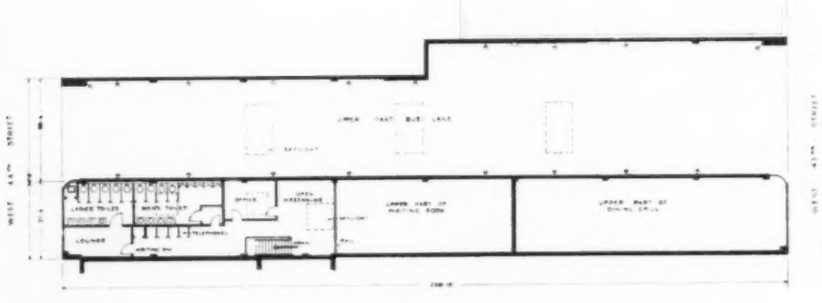
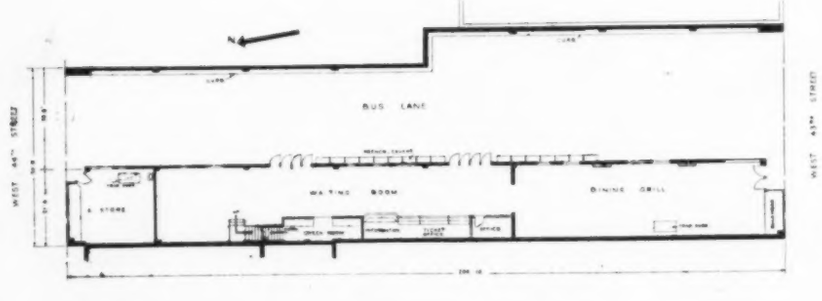


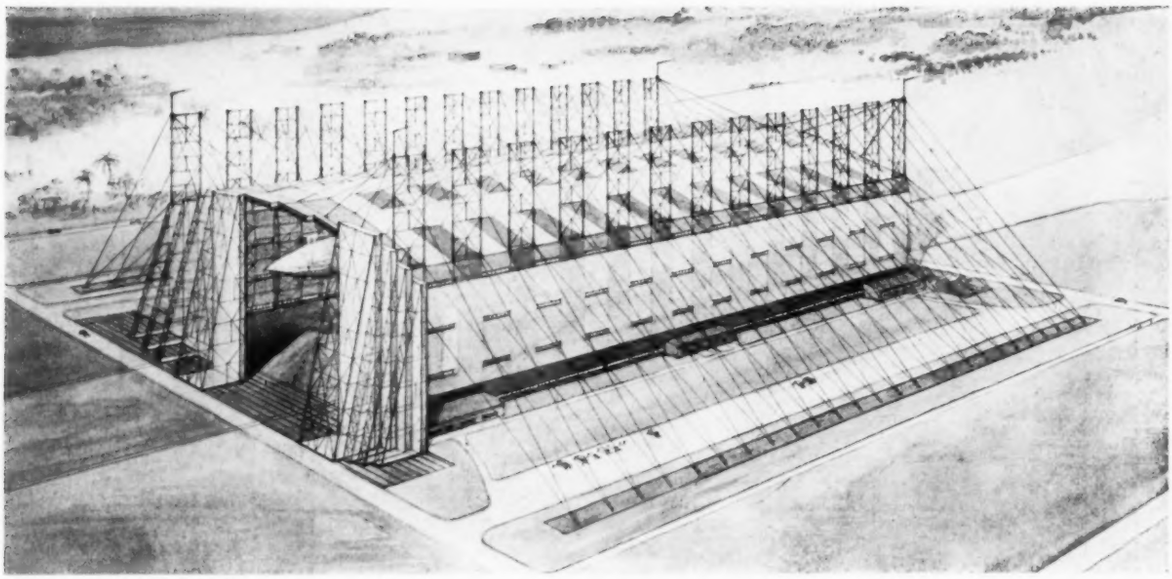
MEZZANINE LEVEL



STREET LEVEL

A BUS TERMINAL, NEW YORK CITY

THOMAS W. LAMB, ARCHITECT



THE RESPESS AIRSHIP DOCK

A NEW TYPE OF DIRIGIBLE HANGAR USING A SUSPENDED ROOF

ROBINSON AND STEINMAN, CONSULTING ARCHITECTS

The construction of the Respess Dock represents a radical departure from all types of dirigible hangars now in use. Instead of arch construction, which is generally in use, the Respess Airship Dock uses a suspension system as shown in the typical cross-section. The inside dimensions of this hangar are 1,000 feet long by 500 feet wide by 225 feet high along the center line. The height of the hangar at the wall is 175 feet.

This hangar was designed to permit the simultaneous construction of two ships 150 feet in diameter. The wind loads were distributed according to data obtained from wind tunnel experiments on model hangars of similar shape. No snow load was considered in the design, as the contemplated construction site is in the South.

LOW COST

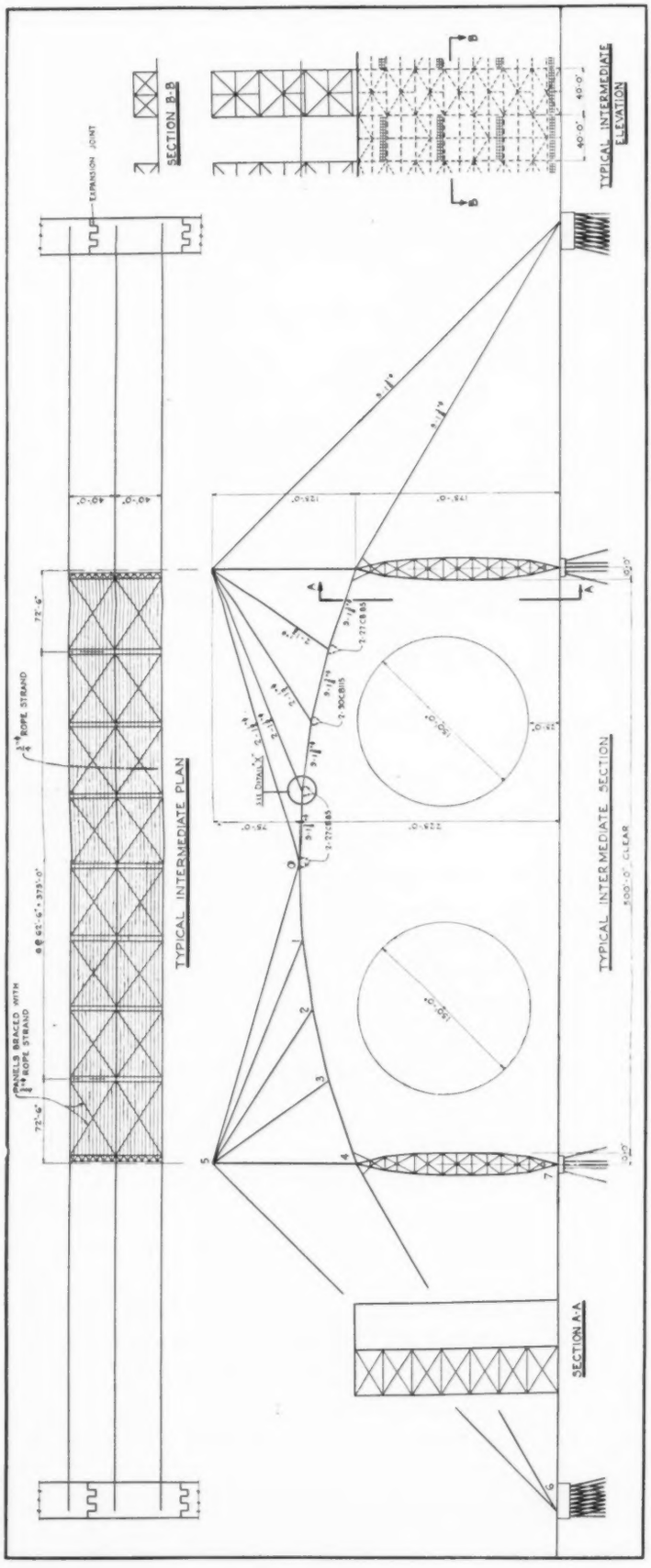
The use of the suspension system in the Respess Airship Dock indicates a substantial saving in cost over the arch type. The estimates indicate that a hangar 1,000 feet in length, open at both ends, and wide enough to permit simultaneous construction of two dirigibles 150 feet in diameter, may be built for $3,050,000. One end may permanently be closed for $225,500 additional.

Doors for the Respess Airship Dock have not been developed at this time. If one door is assumed to cost $375,000, the hangar, with a door at each end, may be built for $3,800,000. A minimum estimate of cost for an equivalent hangar using arch type construction would be $5,000,000, as the Akron Airship Dock, with half the volume of the Respess Airship Dock under consideration, cost about $2,000,000.

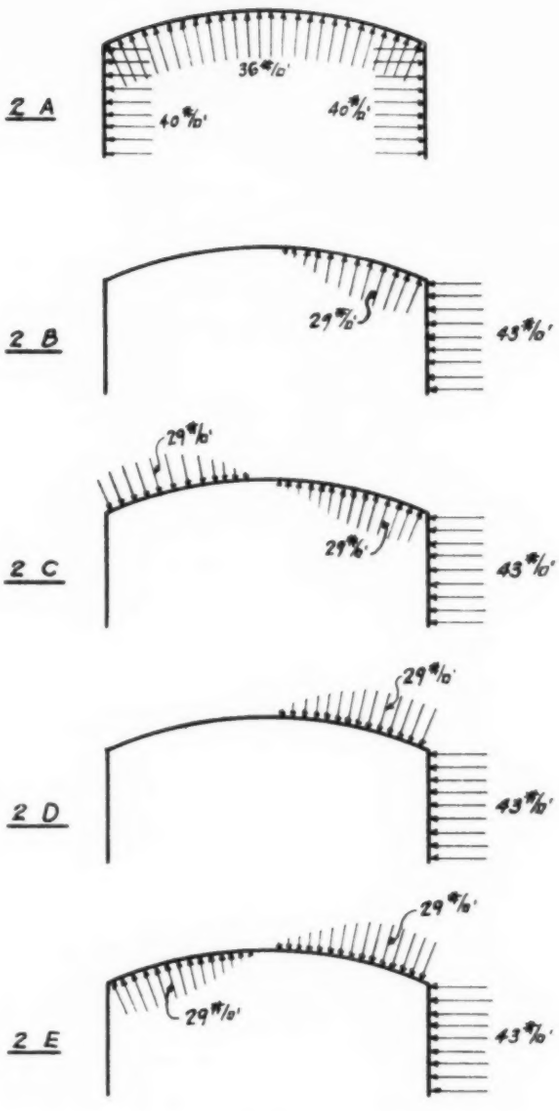
Allowance for snow load increases the above costs for the Respess Airship Dock by $375,000.

SAFETY

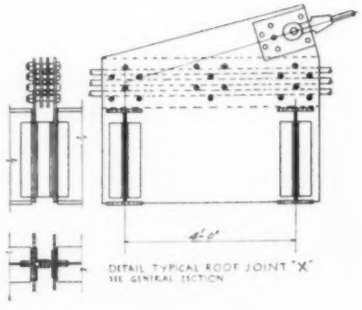
The main carrying members of the Respess Airship Dock consist principally of steel bridge strands which represent the ultimate in inherent strength. This generous use of bridge strands results in a structure which

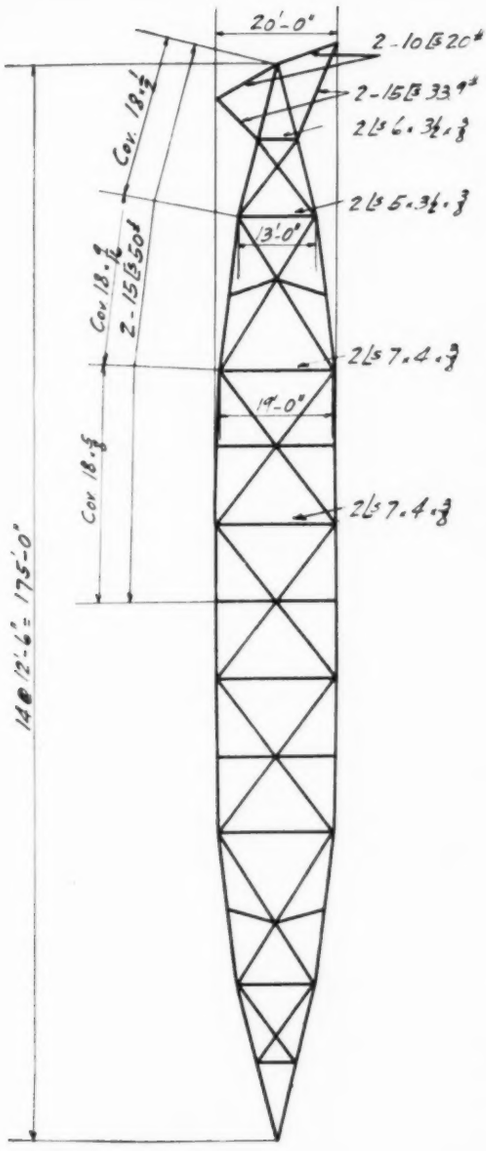


CROSS SECTION SHOWING FRAMING COLUMNS AND CABLES THAT SUPPORT ROOFING MATERIAL OF WIRE MESH AND INTERWOVEN FABRIC



WIND PRESSURE DIAGRAM





COLUMN FRAMING

ALL DIAGONALS AND SUB-HORIZONTALS
ARE TWO ANGLES 3½" x 3½" x ⅜"

RESPESS AIRSHIP DOCK
ROBINSON AND STEINMAN
CONSULTING ENGINEERS

has great resilience, a property which permits the hangar to absorb the impacts coming from sudden gusts of wind.

PERMANENCE

The design for the Respess Airship Dock, as described in this report, is comparable to that of a modern suspension bridge in materials and details of construction. A conservative estimate of the useful life of structures of this type is 100 years *minimum*.

GENERAL DESCRIPTION

The hangar is intended to be a plant for the simultaneous construction of two dirigibles, 150 feet in diameter, thus necessitating a clear width of 500 feet. (A hangar, which is built solely for the storage of two dirigbles, may be made narrower.)

The general plan of construction may be seen on drawings. The hangar space is covered by a suspended roof. The main carrying systems are spaced 40 feet apart. Each system consists of a group of ropes, anchored at 6, strutted to the proper elevation by the side walls 4-7, and following the path 6-4-3-2-1-0. The portion of the ropes forming the roof is held to arched form by stay cables 0-5, 1-5, 2-5, and 3-5. These stay cables are suspended from the top of post 4-5 which is guyed by a group of ropes, 5-6, fastened to the anchorage at 6.

The roof between the main carrying systems is divided by longitudinal girders at points 0, 1, 2, 3, and 4. These girders consist of two beams, laced together into a box section to give vertical and lateral stiffness. They provide support for catwalks, hoists, and other construction conveniences. They also support rope strands which run transversely across the hangar between the side walls.

These transverse ropes support the roofing material which consists of a combined layer of wire mesh and a special fabric interwoven among the transverse ropes. On top of this layer is placed an additional and heavier layer of fabric laid smoothly. The fabric is fireproofed and weatherproofed.

Other types of roofing may also be used. For example, the roof panels may be subdivided by steel beams, instead of ropes, and covered with sheeting or fabric.

The anchorages to which ropes 4-6 and 5-6 are attached are two continuous blocks of concrete, extending the length of the hangar, with expansion joints every 80 feet.

The side walls, 4-7, are designed to act as compression members to support the vertical components of stress in the suspension system. The side walls, being covered with sheeting, must also take a lateral wind load. The roof posts, 4-6, are designed to take the vertical components of stress in the stay ropes and guys 5-6. The side wall columns and roof posts are braced in pairs.

DESIGN OF HANGAR

In the design of a hangar, the principal consideration is that of wind load. The exact wind loads on a structure of this type are a matter of speculation and can only be ascertained with any degree of accuracy by wind tunnel tests of models.

In lieu of wind tunnel tests, which were not warranted by the scope of this preliminary investigation, recourse was had to records of tests already made. Since no tests had been made on a model of the exact shape of the proposed Respess Airship Dock, the wind loads used for this design had to be assumed after a study of existing data.

The wind loads are of two general types: (1) A bursting pressure caused by wind blowing into the open end of the hangar and creating a great negative or outward pressure as in drawing No. 2A; (2) Pressure from wind blowing approximately at right angles to the axis of the hangar. The pressure on the windward wall is positive. The pressure on the leeward wall may have a small positive value or may have a negative value as great numerically as the positive pressure on the windward side.

The wind pressure on the roof, as shown by test data on model hangars, may have great negative value on the windward half and smaller negative value on the leeward half. Accordingly, two wind loadings were assumed as on drawings Nos. 2B and 2C.

Two additional loadings, though improbable in character, were also tested. They are shown on drawings Nos. 2D and 2E.

The maximum positive and negative stresses in each member for the above loadings were noted.

Live load, consisting of the weight of a deflated dirigible, was hung from point w in one half of the roof and then from both halves of the roof. The maximum positive and negative stresses for the live loadings were noted.

Dead load stresses were then computed based upon an initial value of tension in the ropes 4-6 which would preclude all possibility of reversal in stress from any combination of dead, live, and wind loads. The maximum direct stresses are given on drawing No. 3. Rope sizes are also given on this drawing.

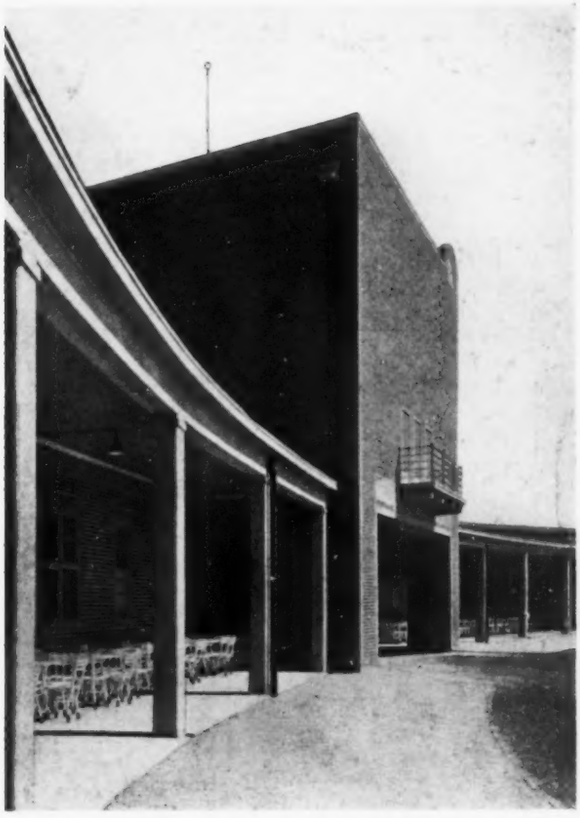
Member 4-7, the side wall column, was designed for stresses due to bending from a lateral wind load, in addition to the direct stress given above. Material for the side wall bent is given on drawing No. 4.

Galloway

A SUBWAY GROCERY STORE FOR THE "A. & P."

A SUBWAY GROCERY STORE FOR THE "A. & P."

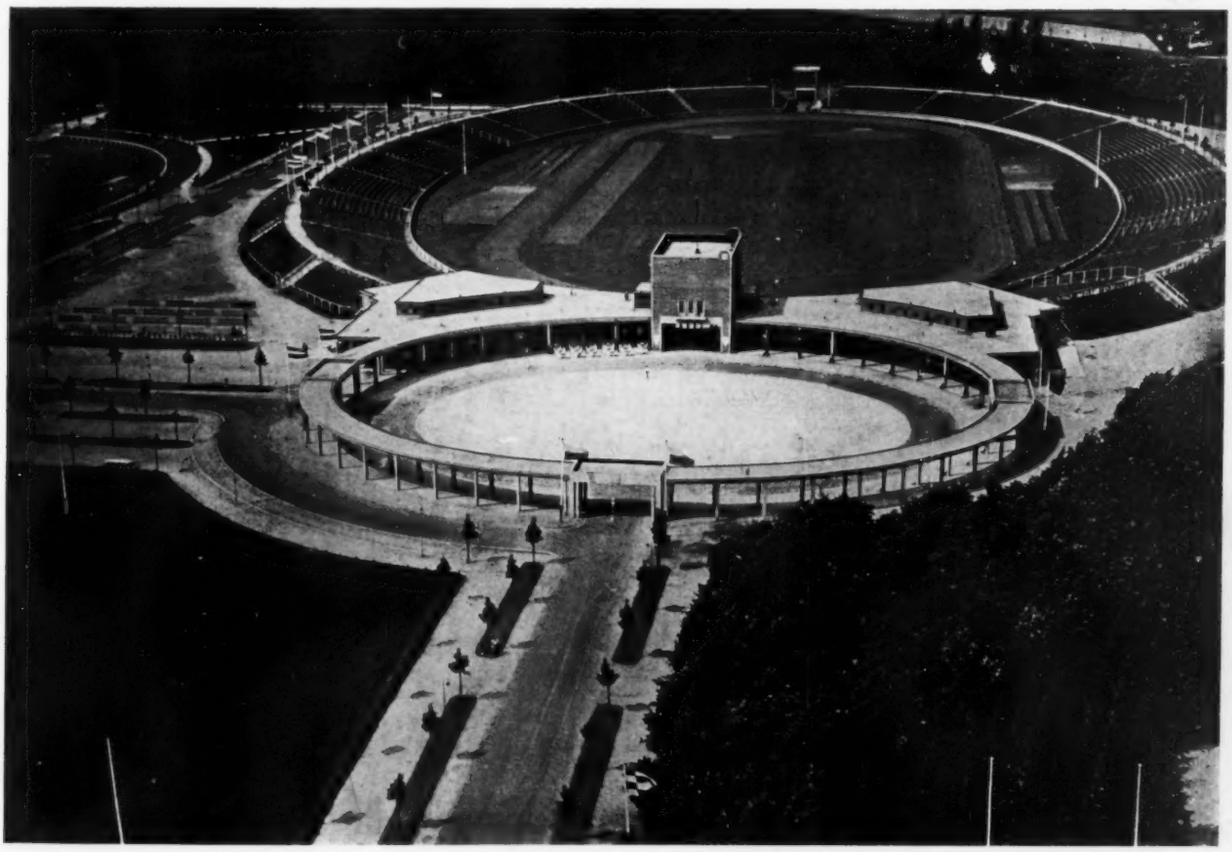
The new Broad Street Railway Station, Philadelphia, has a subway grocery store for the "A. & P." as an accommodation to suburban residents who use the railroad and connecting subway transportation.

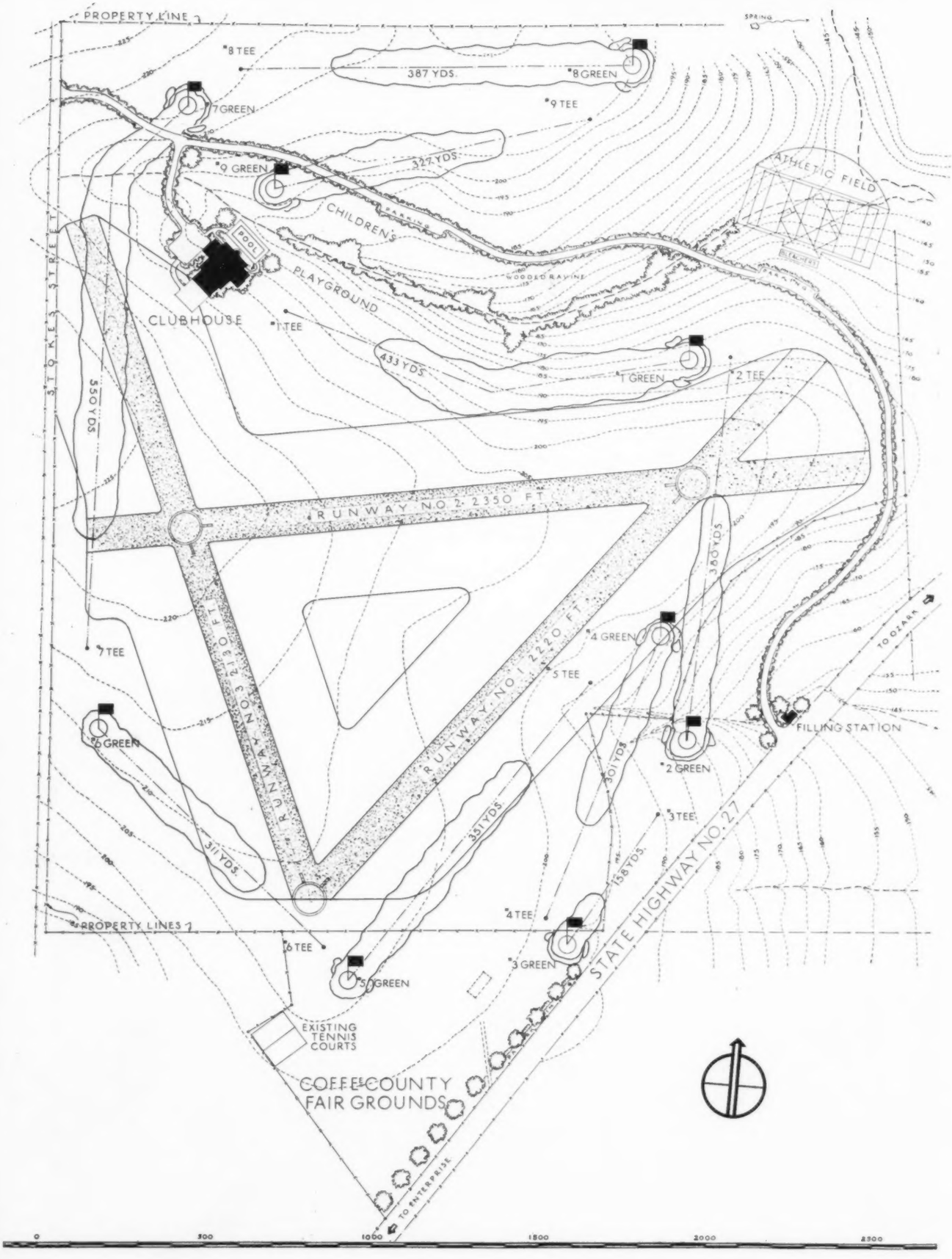


SPORT AND COMMUNITY CENTER, BRESLAU, GERMANY

RICHARD KONWIARZ, ARCHITECT

This building was awarded first prize in the Olympic Games Competition for architecture devoted to sports. Second prize was awarded to John Russell Pope for the Payne Whitney Gymnasium at Yale University.





272 AN AIRPORT AND RECREATION CENTER COMBINED

MUNICIPAL AIRPORT AND RECREATION CENTER AT ENTERPRISE, ALABAMA . . . Now Under Construction . . . Financed by CWA Funds and CWA Labor . . . H. L. Holman, Jr., Architect

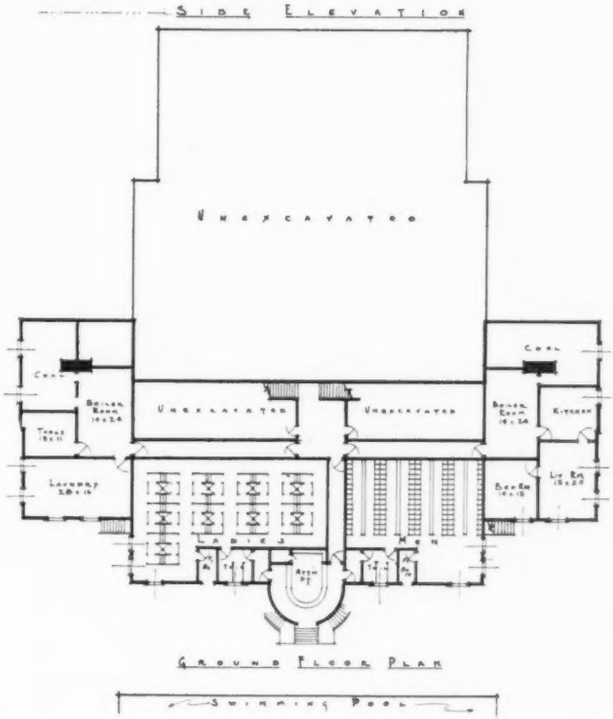
The Enterprise, Alabama, Airport and Recreation Center consists of the following:

1. U. S. Government Regulation airplane landing strips (13 airplane runways)
2. Country clubhouse
3. Nine-hole golf course
4. Swimming pool (40 x 100)
5. Athletic field for football and baseball (bleachers)
6. Tennis courts
7. Children's park and playground
8. County fair ground
9. Municipal auditorium (seat 1,200)
10. Gymnasium and indoor basketball court
11. Dancing, indoors and out
12. Public and private dining rooms
13. Caretaker's cottage
14. Filling station
15. Public comfort station
16. Picnic grounds

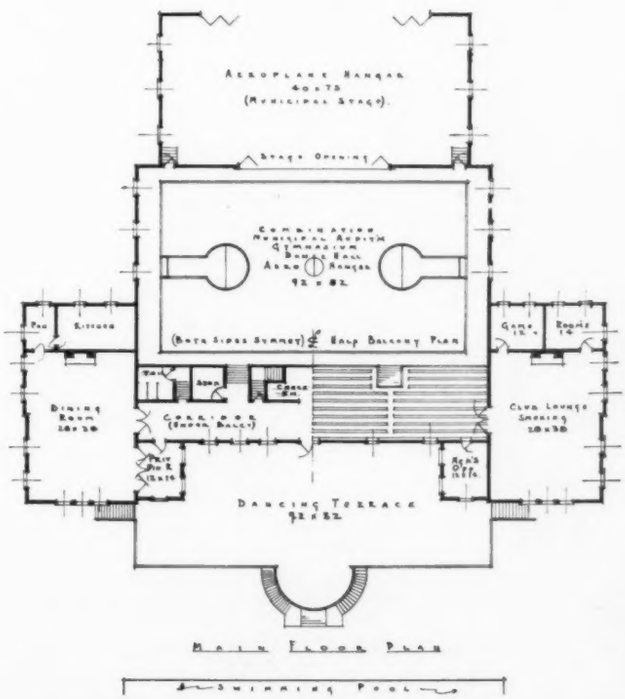
By including the above recreational items in the Airport and by charging a small fee for participation in any of the events, the town will derive an income from the property sufficient to solve the ever-present problem of upkeep, as well as to attract the genearl public to the Airport, consequently stimulating public interest in aviation. In this way it becomes a self-liquidating community asset.

The various activities are selected as an attraction at practically all seasons of the year.

SIDE ELEVATION



GROUND FLOOR PLAN



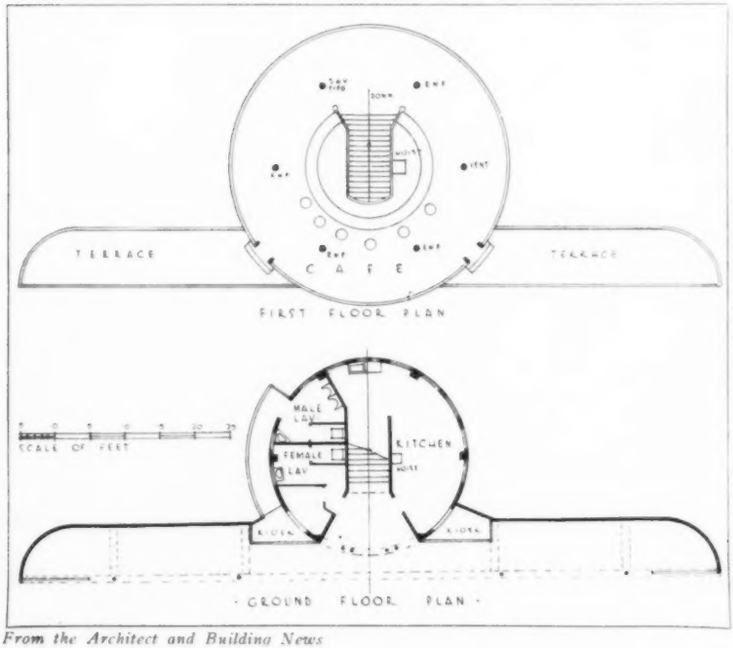
MAIN FLOOR PLAN

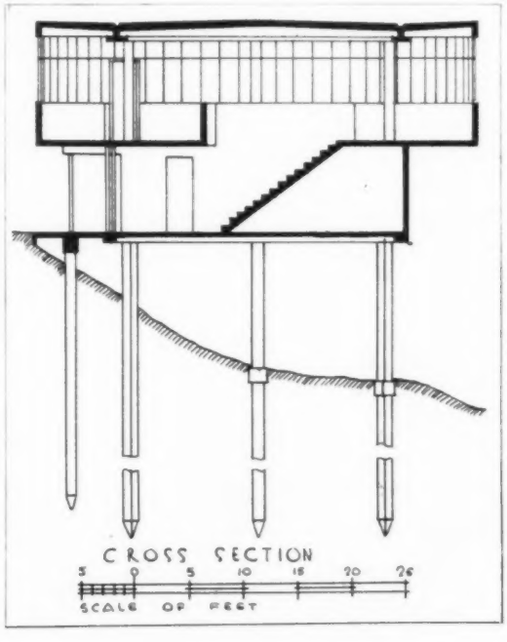
SWIMMING POOL

From the Architect and Building News

A CAFE AT CANVEY ISLAND, ENGLAND

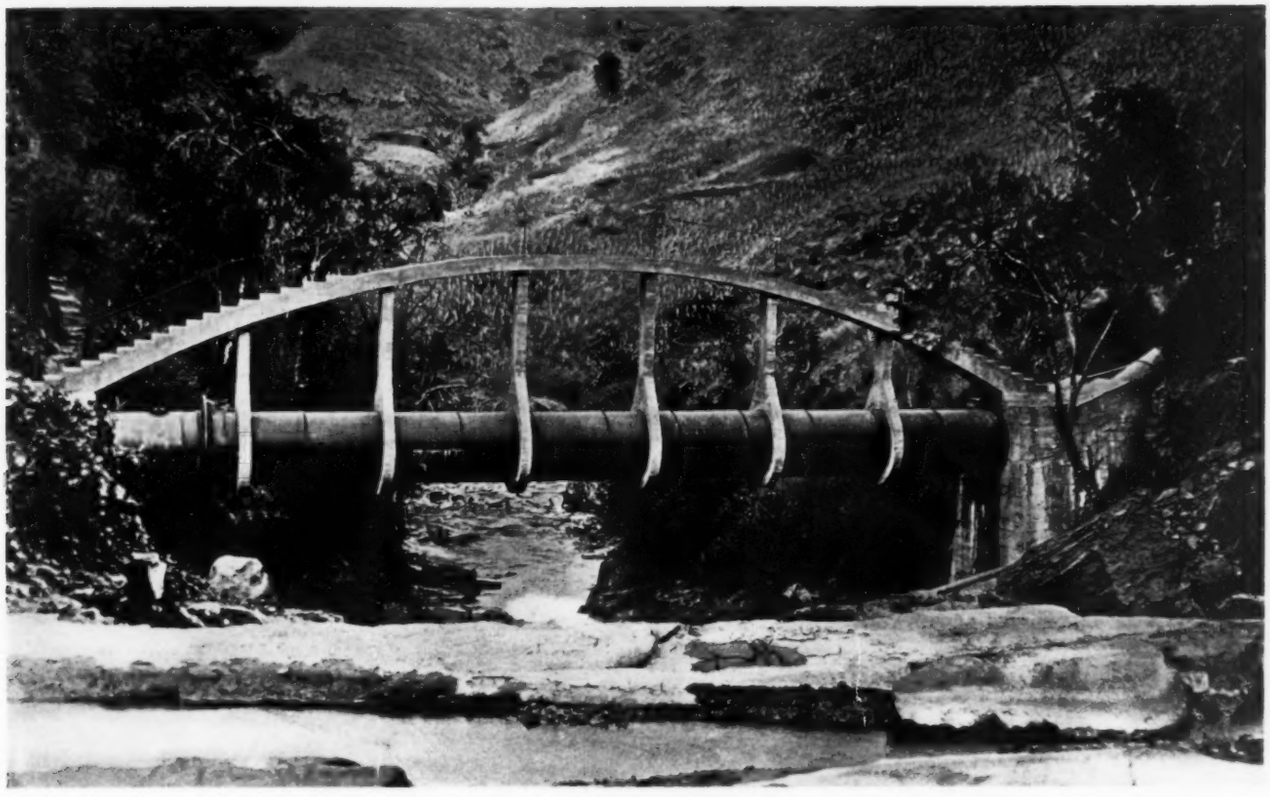
CHRISTIANI & NEILSEN, LTD., ENGINEERS RESPONSIBLE FOR THE PLANNING AND REINFORCED CONCRETE DESIGN AND CALCULATIONS





From the Architect and Building News

A café housed in a circular building along the river bank at Labworth Park. Kitchen and lavatories are below in the circular part. The two wings are adapted for shelters. The structure is of reinforced concrete. The café floor, over 40 feet in diameter, is cantilevered 6 feet 3 inches beyond the kitchen wall. The circular roof is also supported by a cantilever construction supported by internal hollow columns. Rainwater is drained down the hollow columns. Arrangement and reinforced concrete designed by Christiani & Neilsen, Ltd., Engineers.



COMBINED FOOTBRIDGE AND PIPE LINE

CHRISTIANI & NEILSEN, LTD., ENGINEERS

This pipe bridge spans the Rio Fagundes, Estado do Rio de Janeiro. It is 75 feet in length. As the pipe line required two large anchoring bolts on each side of the river, the reinforced concrete arch of the bridge rests naturally on these. The bridge was built over and around the pipe line which was first completed on a temporary wooden scaffolding. To the left, on the view above, between the last suspender and the abutment, is seen the expansion joint in the pipe. Steps are formed on the concrete arch for the use of foot passengers.

Nesmith

THE CHIEF CONTAMINANTS OF URBAN AIR ARE PRODUCTS OF FUEL COMBUSTION. ADDED TO THESE ARE DUSTS AND GASES FROM INDUSTRIAL PLANTS, DUST FROM ABRADED STONE, METALLIC PARTICLES, LINT FROM FABRICS AND OTHER SUBSTANCES THAT ARE NOT NATURAL CONSTITUENTS OF THE ATMOSPHERE.

TECHNICAL NEWS AND RESEARCH

AIR POLLUTION

By H. B. MELLER and L. B. SISSON

AIR POLLUTION

By

H. B. MELLER
Head, Air Pollution Investigation, Mellon Institute of Industrial Research, and Chief of the Bureau of Smoke Regulation, Department of Public Health, Pittsburgh, Pa.

L. B. SISSON
Industrial Fellow in Smoke Abatement, Mellon Institute of Industrial Research, Pittsburgh, Pa.

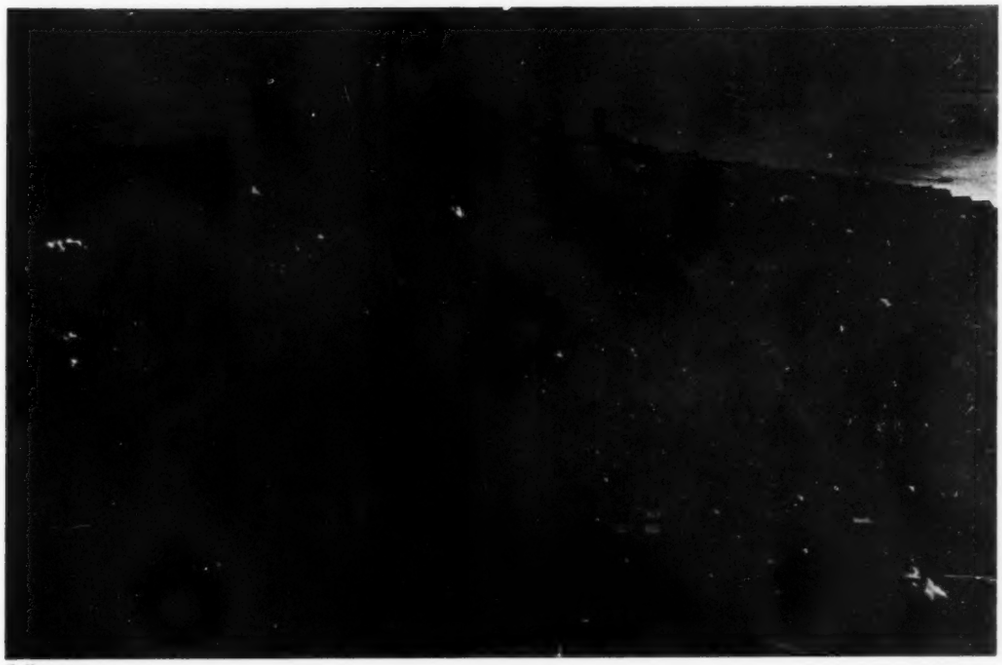
THE PROBLEM

In the last few years science has evolved improved fuel-combustion devices and control methods which the architect can employ to protect his clients and their property. The application of these has lagged because of the low volume of repairs, alterations and replacements of old heating and ventilating plants, and the shortage of new work of this kind. Meantime, the smoke nuisance is reliably reported to have appeared in additional cities and to have been aggravated in some large communities where regulatory efforts were relaxed under severe economic pressure. Within recent months the extension of Administration influence in the construction field has been accompanied by the placing of greater emphasis on the social aspects of housing and urban rehabilitation.

The considerable changes that have come in urban and suburban air control must be taken into account by the architect, engineer and builder. The designer must also give consideration to the fact that preventable smoke and dust are worthless by-products of incomplete combustion and uncontrolled emission, and as such they not only have no sound economic justification, but are permitted to be discharged into city air only because of the good-natured tolerance of the people. How long this tolerance will last is questionable. City people may demand a "new deal" in air as in other matters; they may include smokelessness as being one of the attributes of a "good neighbor."

AIR POLLUTANTS

The chief contaminants of urban air are the products of fuel combustion. Added to these are dusts and gases from industrial plants, dust from abraded natural or artificial stone, metallic particles, lint from fabrics, and other substances that are not natural constituents of the atmosphere. The designer is interested in the combined effects of all these upon structural materials; he also has a second interest in the products of combustion, because he may, through his building design and specifications for the power or heating equipment, be responsible for an increase or a decrease of smoke and dust in the immediate locality.



Galloway

Fuels are gaseous, liquid or solid. In the first group are natural and manufactured gases which, when cleaned and burned with proper appliances, make no visible smoke or dust. Gas is an ideal fuel, within price limitations. The liquid fuel, oil, can be burned smokelessly, but in practice often is not; when it does smoke, due to improper burning, it is highly objectionable. The solid fuels include the inherently smokeless anthracite and coke; semi-bituminous and bituminous coals, with smoke-producing potentialities in direct proportion to the amount of contained volatile matter.

FUELS AND COMBUSTION

For this analysis, fuels may be considered to be composed of volatile matter, fixed carbon and ash. Where the fuel is all volatile, as in gas, or where there is very little volatile matter and nearly all the combustible is in the form of fixed carbon, as in anthracite and coke, it is easy to choose fuel-burning equipment that, with normal operation, will provide complete combustion. As the percentage of volatile matter in the fuel increases, the combustion problem is less simple, and more care is required in the selection of equipment and fuel and in operation to secure comparative freedom from visible smoke.

With solid fuels there is ash, more or less of which is carried out with the stack gases, in the aggregate a large percentage of the solid pollution found in the atmosphere of an industrial city. All of the fuels, except some of the natural gas, contain sulfur in small percentage.

COMBUSTION AND ITS PRODUCTS

Theoretically, combustion is a simple process, being a chemical union of combustible in the fuel with oxygen from the air, the combination producing heat. However, owing to the conditions under which combustion is carried on in a furnace, complications are introduced which may require care to overcome. The number and nature of the difficulties vary considerably with the chemical and physical characteristics of the fuel, the type of furnace and the method of firing.

COMBUSTION AND ITS PRODUCTS

When fresh fuel is fired, its temperature must first be raised to the point where the volatile matter distills off. This volatile matter must be mixed with air, most of which is introduced over the fire. If sufficient air is not supplied, or if the air is not thoroughly mixed with the gases, incomplete combustion will result; there will be carbon monoxide in the gases, and visible smoke will be produced. It is obvious that the smoke-making potentialities of a fuel are in direct proportion to the amount of volatile matter, and are also dependent upon whether the fuel is fired regularly in small quantities (as with a stoker) or intermittently in comparatively large charges. An all-volatile fuel, like gas, can be satisfactorily fed through a properly designed burner which provides for mixing of the gas and air.

After the volatiles are freed from the (solid) fuel, the remainder is coke and ash. Air required to oxidize the carbon is supplied mainly through the fuel bed. The fixed carbon in a soft coal, after distillation of the hydrocarbons, is inherently smokeless and burns similarly to that in anthracite or coke.

Ash produces no heat; much of it is carried out the stack, in fine particles, along with the gases.

The volume of sulfur gases depends upon the amount of fuel burned and its sulfur content—varying from none in much of the natural gas to several per cent in some of the other fuels. Most of the sulfur goes out the stack, partly as a gas and partly occluded in soot. Sulfur trioxide (SO_3) unites with water to form sulfuric acid (H_2SO_4); sulfur dioxide (SO_2) in similar manner forms sulfurous acid (H_2SO_3), which later tends to oxidize further to sulfuric acid.

If combustion is complete, the products will be carbon dioxide and water vapor, plus some compounds of sulfur, and plus such solid particles of carbon and ash as may be forced out by reason of the draft. Only a haze will be visible as coming from the stack. On the other hand, incomplete combustion will result in some carbon monoxide (CO) and the production of more or less visible smoke.

Domestic smoke usually is characterized by the large percentage of combustible material (carbon, hydrogen and tar) and the small percentage of ash. Because usually there is low draft and poor firing, and because the temperature in a hand-fired domestic furnace usually is low, the volatile products are distilled without complete combustion and carried off with the flue gases in various stages of decomposition. The low draft and low velocity in the chimney are responsible for the small percentage of ash.

In larger plants, the fuel is fired more regularly, the furnace temperature is higher, and usually there is better draft. The percentage of combustible in the stack emission is lower, but the amount of ash carried off by the higher draft is much greater.

There are, therefore, as direct air contaminants resulting from the burning of fuel: (1) visible smoke, in volume proportional to the type and amount of fuel burned and the efficiency of combustion; (2) coke and ash, carried off through the stack by the intensity of the draft; and (3) sulfur gases resulting from the burning of sulfur contained in the fuel.

In a consideration of effects, it should be borne in mind that in the broader sense smoke includes all of the products of combustion, whether solid, liquid or

gaseous, visible or invisible—not only visible smoke, and especially not merely that visible smoke which is of a density sufficient to bring it within the limit of restriction indicated in the typical anti-smoke ordinance.

METEOROLOGICAL ASPECTS OF AIR POLLUTION

While in thinly inhabited districts the gases generated in the process of combustion may be a negligible factor, in the atmosphere of large cities, they must be taken into account. Along with the gases are the solids from various sources, which are caught up by the turbulent surface wind and carried away or distributed throughout the atmosphere. Naturally, the densest dust or smoke layer is found in congested communities. The effects of this pollution upon meteorological conditions will vary from city to city, depending not only upon the size of the municipality and its rate of production of impurities, but also upon the rate at which the wind and convection currents can carry away the atmospheric sewage. They vary, therefore, with geographical position, season, average wind velocity, and topography.

Fogs may form more quickly, reach a greater density and be prolonged in the presence of a sustained volume of smoke. The free surfaces of suspended particles are nuclei upon which atmospheric moisture can condense when the saturation temperature is reached. As the smoke blanket builds up, in the absence of sufficient wind to carry it away, until it becomes a veritable giant mushroom, the heat rays from the sun are less able to penetrate to any considerable depth and so to break up the fog by evaporation. In the presence of sulfuric acid, evaporation of fog particles is retarded. Also, a further retardation is caused by oily or tarry substances in the smoke which coat the fog particles. Either a smoke pall or a fog mixed with smoke (smog) can persist for days over a community while the surrounding country area may be enjoying sunshine.

There is less natural sunlight in cities than in the country. On an average, yearly, about a sixth of the visible light is calculated to be screened out in New York City and Baltimore, where studies have been made by the U. S. Public Health Service. The ultraviolet loss is larger, it is thought. Mellon Institute found that, in Pittsburgh during the period from October, 1931, to March, 1932, there was a total of 73 days on which the visibility was less than 8 miles, as a result of smoke and dust as distinguished from other obstructions to vision. The average amount of solar ultraviolet radiation (shorter than 3350 A.) received during these days of "light smoke" was 40 per cent less than that recorded for a similar number of days on which this blanket of light smoke was absent. The "ultraviolet winter" sets in earlier in the fall and lasts longer into the spring than does the "visible light winter" in smoky cities.

EFFECTS OF SMOKE ON STONE

From the aesthetic viewpoint, a building that is coated with grime is a building deteriorated, even though the coating of dirt may, in fact, be protective to a degree. That is the case when noncorrosive products of combustion settle upon stonework. If these contaminants are carbon and ash, not accompanied by tar, they can be removed by the simple process of brushing. When tar is present, especially in the case of soot, the condition is aggravated. The tar causes the soot to adhere firmly to the stone, with the result that the surface is

Sandblaster while cleaning outside wall of building wears protective suit, but pedestrians are not guarded against abraded dust which becomes an active air pollutant.

Grimy part of prison wall, in contrast with cleaned portion, shows accumulated soot and tar transmitted through atmosphere. (See opposite page).

Galloway

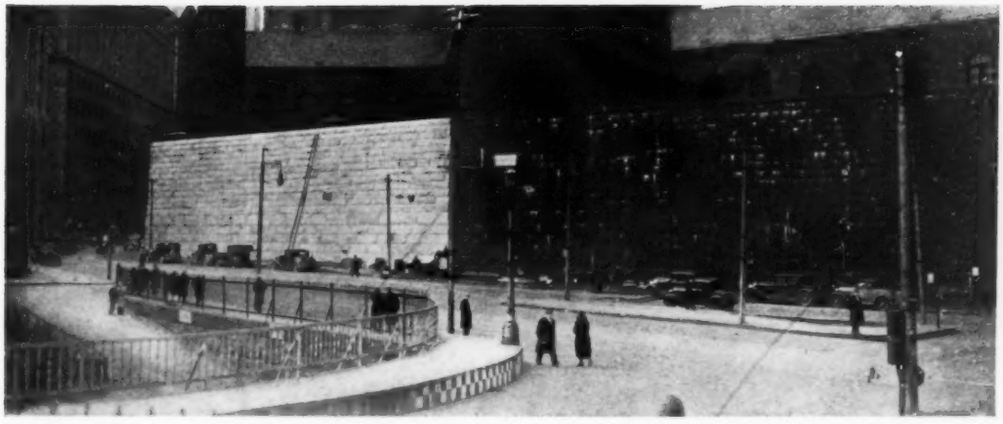
EFFECTS OF SMOKE ON STONE

covered with a coat of black paint which penetrates into the porous structure. This coat is not readily removed, because it has adhesive properties and also because it is insoluble in water. Steam cleaning, the use of solvents or special detergents, such as sodium metaphosphate, or scouring must be resorted to. And of course, the stone soon becomes as dirty as before, unless conditions with respect to atmospheric pollution are changed in the meantime.

Rock *in situ* contains water in amount proportional to the percentage of porosity. Additional water may be absorbed soon after quarrying; this contained and absorbed water, saturated with various substances in the rock composition, gradually comes to the surface and is evaporated, depositing the dissolved minerals in the form of a hard, compact crust which is a protection to the stone beneath. It is obvious that the removal of this crust in the process of cleaning will leave the stone open to weathering until another crust or a coating of noncorrosive dirt is formed as a defense against erosion.

When corroding agents are present even in the small amounts found normally in city air, there may be definite action on certain types of stones if they are brought into contact. Of these agents, sulfuric acid is the most important. Sulfurous acid is not particularly active, but becomes so when changed to sulfuric acid. Hydrochloric acid is of less importance; ammonia and hydrogen sulfide have practically no corrosive effect on stone, but do act upon some exposed metals.

It was stated that part of the sulfur acids leaving the chimney is occluded in soot and part goes out in the form of gas. That which escapes with the flue gas is dissolved by rain and will corrode material with which it comes in con-



tact, but it is soon washed off. That occluded in soot is more injurious, because of its propensity to adhere firmly to the stone. It is not readily washed away by rain and in all probability, if the stone is corrodible, the action is complete.

The corrodible stones are those that contain larger or smaller amounts of the carbonates of calcium and magnesium—limestone, dolomite, and sandstones with a calcareous cementing material. Granites, gneisses, and sandstones in which the grains of sand are cemented by substances other than the carbonates are but little affected by the corroding agents derived from combustion.

The action of sulfuric acid upon stones containing carbonates of calcium and magnesium is to change the carbonates to sulfates. This chemical action involves a change in volume. Still more important than the volume change is the pressure developed by the sulfate crystals growing in definite oriented directions. The stone becomes more porous, loses its cohesion, and disintegrates more readily under the action of the weather.

Action upon concrete is similar, gypsum being formed from the lime in the cement. In addition, the acid reacts upon the aluminate of the cement, forming a complex substance the volume of which is three times that of the original aluminate. The pressure developed in the aggregate is tremendous.

Mortar has a rather porous structure, and besides, it is in process of chemical change for some time after it is placed. It is particularly subject, therefore, to the action of atmospheric acids.

EFFECTS OF SMOKE ON METALS

What has been said about the effects upon stone of a coating of tar, carbon and ash, without accompanying acid, applies also to metals. The covering is protective to a degree, but any intended decorative effect is spoiled, if not entirely destroyed. Scouring may be necessary to rid the surface of soot and tar, but injury to the metal results through abrasion.

When acid is present there is action upon corrodible material. This action is accentuated when the acid is occluded in soot—not only because the accompanying tar causes the soot to adhere firmly to the metallic surface, but because any free carbon that the soot may contain is electro-negative, while the metals are electro-positive; thus galvanic action takes place readily under these conditions and when water is present.

The action of acids, even in small amounts in the atmosphere, upon the common metals used in constructional work is well known. Iron is readily cor-

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LEFT: Dust counter.

RIGHT: An "electric eye" which automatically records amount of smoke in the atmosphere.

roded in moist air containing acids; this action is much more rapid in the city with its large volume of products o fcombustion than in the country. Corrosion is made much more rapid by any arrangment of substances making possible electrolytic action. When coated with zinc, iron corrodes more rapidly, once the coating is broken, than either metal alone, because of electrolytic action. On zinc itself there is formed a thin coating of white basic carbonate, soluble in sulfuric acid, which is destroyed readily in air carrying acid vapors. Tin is greatly affected only when it is used as a protective coating for iron, especially when part of the coating is worn away, exposing both metals. Where tin is imperfectly soldered, electrolytic action hastens corrosion. Copper becomes coated with verdigris in moist acid-carrying air. While but slightly affected by dilute hydrochloric and sulfuric acids, copper is particularly sensitive to the action of hydrogen sulfide (as is brass), and is attacked readily by both ammonia and nitric acid, which always are present in small quantities in the air. Lead surfaces dull on exposure, but there is no appreciable corrosion.

EFFECTS OF SMOKE ON METALS

Metallurgical research offers to the architect chromium, aluminum and corrosion-resisting alloys of other metals. The exposed metal surfaces on the Empire State and Chrysler buildings are examples of recent practice in this type of ornamentation. No deterioration is evident after about four winters of New York air, although the griming is as great as with other metals. Cleaning with "pure" soap and water removes the dirt and, so far as is evident, leaves the original properties of the metals unchanged.

Often paint films are found to have dried with tacky surfaces that readily collect soot and dirt. Sulfur dioxide will cause such a condition when high per-

centages of carbon dioxide are present and the humidity is high. While the appearance is marred, soot and dirt are protective, in that they obstruct ultraviolet light and so tend to increase the life of the paint coating. This is of course aside from any action the atmospheric acids may have upon ingredients in the paint.

Increasing use in all types of structures of metals and alloys that are not particularly resistant to atmospheric corrosion has kept paint chemists busy at their problem—to maintain a sufficient concentration of hydroxyl ions next to the surface of an underlying metal.

EFFECTS OF SMOKE ON INTERIORS

Wherever there is air there is dirt—more or less as the outside air is dirty or clean, or the inside air has been filtered. This dirt is carried everywhere by air currents, and increases in griming qualities in proportion to the amount of accompanying tarry matter.

The market does not afford the designer a paint or wall covering the life of which is not shortened by soot. Nor can he make free use of white and light colors in a smoky community. The possibilities of making fullest use of natural lighting are curtailed by the fact that not only is much light absorbed in the atmosphere, but skylights and windows quickly become coated with soot. Interior decorations such as curtains, hangings and rugs pick up the dirt, so that delicate colors cannot be used with any degree of satisfaction.

EFFECTS OF SMOKE ON TREES AND SHRUBBERY

The smoke, dust and gases from the combustion of fuel have the power to check growth or fruition in vegetation. This is evidenced not only by the external appearance of many of the plants, but also by their internal appearance as shown by the size of annual rings and by lesions in leaves. Leaves acquire a tarry "overcoat," especially marked in the case of evergreen plants. Sunlight cannot penetrate the film and the plant is unable to feed properly. Sulfur dioxide, when present, is absorbed by the leaves and forms sulfuric or sulfurous acid, both of which are toxic in the tissues of the leaves. This injury of plants by sulfur is especially marked in time of fogs.

In some cities, evergreen plants are washed or sponged several times a year, to insure that they shall live and grow. A sodium metaphosphate-soap solution is especially useful for such cleaning. The use of plants for ornamental purposes has been severely curtailed by smoke palls, nurserymen report.

HYGIENIC ASPECTS OF THE SMOKE PROBLEM

The psychological and hygienic aspects of air pollution are so closely related that for practical purposes neither can be considered separately. Mental and bodily states react on each other. A smoggy day irritates the mind as well as the respiratory tract, although by different processes. The performance of even routine tasks is affected unfavorably, according to surveys of clerical forces. Common observation is that the feeling of depression often is translated into a nervousness that does not depart until the smoke pall is blown away.

The effects of air contaminants on the body range all the way from those that appears to be transiently and mildly irritation to those that may be serious, or even fatal. None of the solid or gaseous products of the combustion of fuel is held wholly harmless in relation to human health.

HYGIENIC ASPECTS OF THE SMOKE PROBLEM

Air-borne impurities coming in contact with the sensitive membranes of the eyes, nose and throat may aggravate or cause diseases of these organs. Sinus trouble and severe coughing often accompany inhalation of excessive smoke. Atomized (unburned) oil is irritating to the upper respiratory tract. Poisonous compounds which are swallowed may cause nausea or systemic disturbances.

It is in the respiratory tract that the direct effects of the breathing of atmospheric pollutants have been most explored by medical research. Pulmonary anthracosis (not in coal miners) resulting from the retention in the lungs of carbon particles from air breathed is distinctly a disease of the city dweller and is proportionate to the smokiness of the air. With the quantity of carbon particles accumulated by a person in a large city there is an accompanying fibrosis which impairs the elasticity and alters the functional capacity of the organ.

In England, some medical men who are also public health authorities have made surveys and reported a direct relationship between the prevalence of bronchitis and the volume of air pollutants arising from chimneys.

In America, a relationship between pneumonia and smoke has been suspected but no complete investigation, coupling field data with mortality records and laboratory findings, has been reported. In making studies along this line in Pittsburgh, it was found that the districts which reported the most pneumonia were the smokiest and also about the poorest in housing and some other respects. These factors made the studies very complicated and did not permit of conclusions one way or another. Among the physicians who have continued to think there is a direct relationship between smoke and pneumonia is Dr. Samuel R. Haythorn, director of the Singer Memorial Laboratory. He has been collecting autopsy material from Pittsburgh lungs for a quarter of a century, and has recently organized a medical staff to study the material. The Pittsburgh Department of Health also has assigned a physician to gather ample field data on current pneumonia cases.

One of the facts connected with acute inflammatory conditions of the lungs is the value of having unobstructed lymph spaces. Where air pollutants have obliterated these lymph spaces, however, the gravity of the condition is increased. Solid contaminants which have been breathed in, and which of themselves may not directly act on lung tissue, can by their mass clogging be indirectly very serious.

The refusal of the acute respiratory disease death rate to decrease in near the proportion that most other disease death rates have dropped in the cold months in cities is responsible for the ceaseless quest being conducted for predispositionary and contributory causes. Air pollution is one of these, but its rank still is debatable.

Medical research along a related line is reporting upon the direct effects of the inhalation of one certain air pollutant, silicon, which exists in nature chiefly in the form of the oxide, SiO_2, and as silicates of various kinds. Ash containing silica is among the products of the combustion of solid fuel and is carried out of the stack mostly according to the velocity of the draft. Abraded constructional materials and highway surfacings also are sources of silica particles in city air. In industrial and some other operations silica is frequently

described as "rock dust" and investigations into it have been authoritatively reported on by the U. S. Public Health Service, the U. S. Bureau of Mines, and others. Other studies now being pursued are taking cognizance of the effects of combinations of dusts. This latter type of study is deemed necessary for an eventual relation of the findings to city air.

These investigations appear to be headed toward an authoritative determination of the "safe load" of the sizes, the kind or kinds, or combinations of kinds, of air-borne solids that may be breathed.

Among the indirect hygienic effects of smoke is the interception of some, and in cases all of the shorter ultraviolet rays of the sun. These rays are the natural source of vitamin D; in addition, they restrict bacterial growth. Rickets, and other disturbances of the metabolism of lime salts very important to health, result when this short ultraviolet radiation is excluded from the body. When the nutrition of the body is thus vitiated, it becomes more susceptible to bacterial infection.

Galloway

AIR POLLUTION

PREVENTIVE MEASURES

Measures adopted to protect structures from the effects of atmospheric pollution may be discussed under five general heads:

1 CHOICE OF SITE AND ORIENTATION OF BUILDING;

2 DESIGN;

3 SELECTION OF MATERIALS, INCLUDING PROTECTIVE COATINGS;

4 POSSIBILITY AND EASE OF CLEANING, AND

5 SMOKE AND DUST CONTROL.

SELECTION OF A SITE If there is possibility of selection from a number of available locations, it is of primary importance to know something about relative dirtiness. There may be available data from sootfall studies such as have been conducted in various cities, or it may be feasible to have the air sampled over a period of time at each of the possible sites. Failing these, some indications of the condition of the atmosphere can be obtained by making a visibility study or by observing the luxuriance and vitality of trees, flowers, shrubbery and grass. There also are records, which may be secured upon request, of various tests which reveal the corrosive properties of the air in some localities. These will give cues relative to the rate and seasonal intensity of attack against which provision must be made.

In orienting a building, the utilization of sunlight for illumination is not the only objective. The beneficial hygienic effects of direct sunlight, especially of that in the ultraviolet region, are to be considered. Likewise, the use of sun-heat to counteract dampness is of importance.

DESIGN In the presence of very good air conditions, there may be a wide latitude in de-

DESIGN

sign. Such circumstances specially favor the flat-roof, sun-deck type of building. Not nearly as much care need be taken to guard against exterior irregularities of line which would serve as shelves or pockets to catch and hold the black and corrosive contaminants from the air.

The problem is complicated when the air carries considerable concentration of the products of combustion. Under such conditions it is likely that the architect will simplify his design and will eliminate irregularities or dirt-catchers as far as possible. This may involve setting the windows practically flush with the exterior wall and excluding projections that might trap sooty or acid water which later would trickle down the face of the building in a jagged pattern. The solution retained along shelves becomes more acidic as the water evaporates. This favors severer destructive action on mortar, stone and metal. If there are cracks in constructional material, such as sometimes are seen at window ledges, any projecting surface which interrupts the flow of polluted water will divert it into the fissures and assist disintegration deeper in the wall.

SELECTION OF MATERIALS, INCLUDING PROTECTIVE COATINGS

Scientific research in building materials, paints and lacquers has been so extensive and has produced so many new combinations that an architect well may be excused if he honestly confesses that he does not know the "last word." As a matter of fact, this "last word" still lies somewhere ahead. The task of the designer is to choose the best of that which is available.

From the standpoint of evading damage by air pollution, choice of outside wall materials will be toward the resistant stones and glazed ceramic products, because they are not affected by atmospheric acids, are easily and cheaply cleaned, and do not discolor under sunlight. Special attention will be given to the composition of mortar, in order to check disintegration by acid compounds.

The development by metallurgical research of acid-resisting alloys, especially for exposed trim, has been mentioned. Likewise, paint chemists have been searching for the best combinations of materials for protective coatings for metals that are not resistant to atmospheric corrosion. One of these, recently reported, is composed of 1 part linseed oil, 2½ parts bakelite and 8 parts chinawood oil for the vehicle; blue lead and zinc chromate as pigments.

A Navy specification for exterior metal protection prescribes 2 pounds of aluminum powder to 1 gallon of the foregoing proportions of linseed oil, bakelite and chinawood oil. The same specification has been adopted by some, at least, of the electric light companies for painting iron poles.

For covering exterior stone, aluminum stearate and aluminum palmitate, available in any tint, are being used extensively as resistants to city air contaminants.

Some recent research directs the use of a coat of aluminum wood priming for protection of either exterior or interior wood surfaces; to be followed, on inside woodwork, with two coats of a pain which has a phthalic-anhydride-glycerol type resin (30 per cent nonvolatile) for vehicle, and either lithopone or titanium-reduced pigment. For outdoor application, the nonvolatile element in the vehicle is increased to 50 per cent, with zinc, lead or titanium for pigment.

These examples of the fruits of research are not to be considered as either all-inclusive or necessarily the best, but as illustrating the trend of paint technology away from simple and familiar formulas and toward more complex and decidedly more expensive mixtures. The goal being striven for is not merely the delay of corrosion in structures, but the securing of practically complete protection of the structural materials, with a protective coating which itself shall be highly resistant to deterioration by atmospheric contaminants and the abrasive action which accompanies cleaning.

In connection with the protection of corrodible metals or metallic pigments, attention should be accorded a series of studies on the causes of corrosion of metals, made in England in connection with monthly sootfall collections. It was reported that the rate of attack on metals exposed to city air was found to be directly proportional to the concentration of air pollutants, regardless of the season. Where dust settles on commercial metallic surfaces (save in the instances of chrome-steel alloys or pure aluminum and perhaps some other cases) the difference in electrical potential between the dust particle and the metal makes possible electro-chemical action, leading to pitting and crystalline deformation which can be detected only by testing for loss of electrical conductivity or by a study of photomicrographs. Moisture, which is present always in air, has a part in the action.

In cities where there has been a considerable increase in air pollution in recent years, it is a question if some of the older structures carry as high a safety factor as that with which they were originally credited.

CLEANING

In communities where the uncontrolled smoke and dust content of the air amounts to a continuous nuisance and where there is a sufficient concentration of air-borne sulfur-compounds to damage buildings and contents, the owners and managers of business establishments are just as ready as are housewives to listen attentively to suggestions that promise permanent reductions in cleaning, maintenance and replacement costs and that at the same time will result in cleaner exteriors and interiors. These will attract customers, clients and lessees.

The place to start to plan for a paring of operating and replacement expenditures is in the original design of the construction or in the remodeling of a building. In carrying out this idea, the architect chooses materials that are resistant to the disintegrating effects of smoke deposits and then arranges them to facilitate removal of the grime. Sharply broken surfaces are replaced by mass flatness; angles tend to become exceedingly scarce; variation in line is supplanted by large areal depressions and by variations in color. The underlying idea is to secure surfaces inside and outside that lend themselves to rapid and cheap mechanical scrubbing and drying, and will not abrade under such treatment.

The plan of rapid and frequent cheap cleaning may call for door frames and window casements, and the surfaces of the doors and windows, to be flush with the flat wall, so that the scrubbing movement can be continuous.

SMOKE AND DUST CONTROL IN A BUILDING

The architect does not need to be reminded of the importance of proper loca-

tion and arrangement of the boiler room. A wrong location with reference to the fuel-storage space, to the stack which is to carry off the products of combustion, or to the distribution of the steam, hot water or warm air, easily can increase the cost of heat production.

In the selection of fuels and fuel-burning equipment there is wide latitude. The choice will depend, in most cases, largely upon what is the logical fuel in the particular district. If it should be gas or anthracite, the choice of equipment to provide for smokeless operation is simple. If it should be bituminous coal, however, the first decision to be made is whether the coal shall be burned in its raw state, or coke shall be used. In the latter event, no extra precautions will be necessary. Should the decision be in favor of raw coal, the demand for steam or heat will determine whether the fuel shall be fired by hand, or fed automatically. Automatic feed is best in all cases, but for small installations (heating boilers under, say, 2,500 sq. ft. rated capacity) the general practice is to fire by hand. For all cases in which the coal is not fed automatically, the boiler should be of the approved "smokeless" type or the fuel used should have volatile matter not to exceed 20 per cent.

The stack should be of a cross-section and height sufficient to furnish the necessary draft and to carry off the gases at a reasonable (not excessive) velocity. City bureaus of smoke regulation have tables of stack sizes that conform to good practice. It scarcely seems necessary to say that a stack must be higher than any nearby building, but many cases where this simple imperative rule has been violated can be seen in any city.

These are matters that have to do directly with the making or prevention of visible smoke. For the comfort and convenience of persons in the building, it is possible to purchase fuel that has little or no dust, or that has been treated to prevent dustiness in the boiler room. This is of distinct advantage where the basement or cellar is to be used for other purposes, as well as to prevent contamination of the air in the building by dirt from the fuel.

As protection from excessive air pollution in outside air, recourse may be had to filtration of air brought in for indoor uses. Architects will learn with interest that during the current heating season, in some rather well-rated residential districts, manufacturers engaged in installation of air conditioning equipment have encountered difficulties by reason of the periodic appearance (generally in connection with smogs) of unexpectedly large volumes of excessively tarry or oily soot, frequently acidic, and in very large proportion coming from the chimneys of the private dwellings or small business places in the immediate neighborhood. All such difficulties have to be met by expenditures for more extensive filter area or replacement of the filter devices, or both. The condition is not promotive of lower prices or easier operation of the air conditioning systems.

In congested areas the use of roofs for recreational purposes is increasing. In designing for this, the architect must consider not only the contaminants in the air of the district, but those that may come from the chimney of the building in question. Obviously, the matter of general pollution must be handled in a community way, but no roof will be usable with any satisfaction if the chimney on the building is permitted to smoke or to emit quantities of dust.

The prevention of visible smoke has been touched upon; other solids must be separated from the gas stream. This is feasible to a very satisfactory degree by use of one of the various types of dust separators now on the market. Space will not permit a discussion of the methods, but it is believed designers are familiar with their operation in many large plants, and will see the advantage of extending their application.

AIR POLLUTION CONTROL ESSENTIALS

In connection with the several foregoing considerations of methods of protecting against the effects of air pollution, it may be asked why it would not be cheaper and really easier to control the output of smoke and dust in the first instance. It would, but the difficulty is that those responsible for this air pollution are neither the only nor perhaps the worst sufferers from it. If they were obliged to retain it in the atmosphere immediately surrounding their own structures, the story would be different. So far, apparently, one of the conceptions of being a good neighbor is to stand, more or less uncomplainingly, for damage caused by someone else's smoke.

With negligible exceptions, city ordinances attempt to regulate only smoke so dense that it is impossible to see through it as it leaves the stack. Even the densest smoke is permitted for a matter of minutes at varying periods. Contaminants that do not color the smoke stream are wholly unregulated. Ordinances are not flexible, they do not provide for progressively stricter standards. The forces of inspectors are everywhere inadequate. Almost all cities exempt private dwellings, which are known to be heavy contributors to the nuisance.

For communities that do feel that something constructive in the matter of general control can and should be done, the way is open.

It is easy to indicate the limits to which existing (or new) ordinances could be raised:

(1) no dense smoke in normal operation, light smoke only according to character of logically available fuel;

(2) alterations and repairs to meet the new standard of smokeless operation;

(3) time limit for compliance by all fuel-users;

(4) dust separators in cases of excessive emission;

(5) progressive ordinance revision as improvements in fuels, appliances and practices are made.

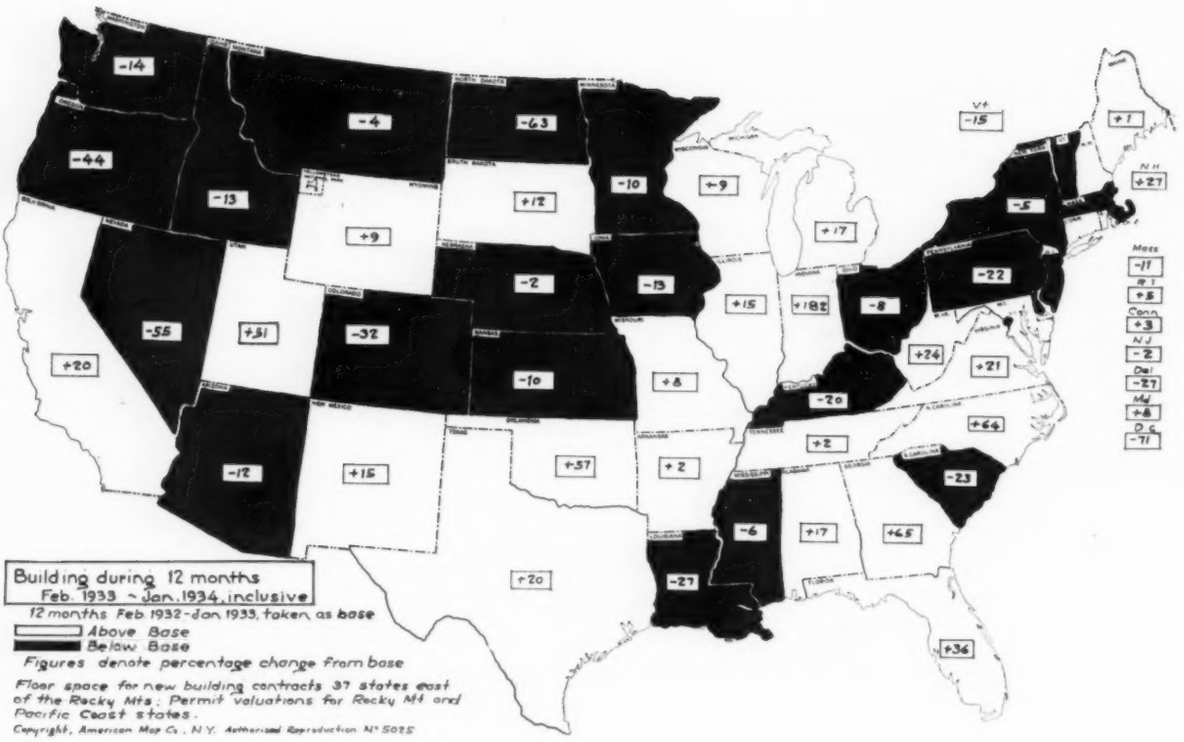
Complete elimination of air pollution being impracticable, a community movement toward purer air needs first to learn the reasonably attainable limits and be satisfied therewith. The scientific manner of securing this knowledge is by survey which will determine:

(1) the sources and extent of the actual polluation, and its effects;

(2) the logical combinations of fuels and appliances for a particular community:

(3) agreement among leaders of commmunity thought to make a sustained effort to strive for the reasonable goal.

In this effort the designer can, if he will, assume a leading rôle by authoritatively advising present and prospective building owners of the unnecessary expense incident to damage by preventable air pollution.



BUILDING TRENDS AND OUTLOOK

By L. SETH SCHNITMAN, Chief Statistician, F. W. Dodge Corporation

Contracts let during January in the 37 Eastern states showed a gain of over 100 per cent over January, 1933; but the total of $187,463,700 was almost 10 per cent smaller than the contract volume for December which totaled $207,209,500. The current January total was only 5 per cent behind the volume for the entire first quarter of 1933; this discloses how great has been the relative improvement over the lethargic conditions of last year.

January contracts for residential building totaled $15,110,400 as against $23,899,600 for December and only $11,950,900 for January, 1933. Awards for nonresidential building amounted to $58,616,100 in January as compared with $50,040,000 for December and only $28,731,600 for January of last year. Public works contracts (of engineering types) awarded in January not only exceeded the totals for both comparative periods but were more than 60 per cent larger than those reported for the entire first quarter of 1933. Public utilities awards fell sharply from December but were maintained above the level of January, 1933.

Based on figures for the first three weeks of February, the contract total for the 37 Eastern states for the entire month fell sharply from the record for January, but the contract volume was almost twice as great as was recorded in February of last year. The sharp decline from January was occasioned by a slackening in the PWA program; privately-financed construction appears to have run ahead of both the January volume and that for February of a year ago.

MATERIAL PRICE MEASURING ROD*

The prices in this tabulation enable one to visualize at a glance the main trend of the material market. Their significance does not extend beyond that point, and the explanation below should be read carefully.

F. W. Dodge Corporation Composite Prices as Indicated in Explanation

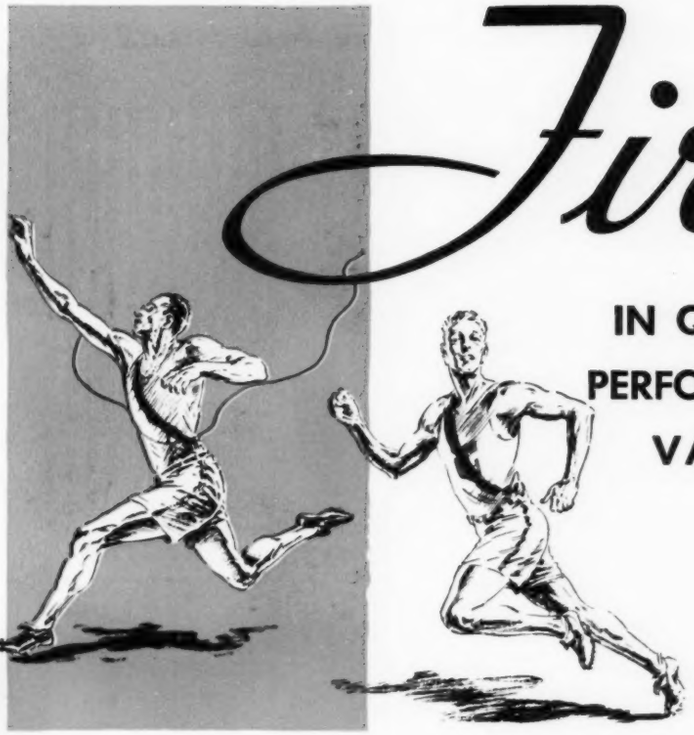
Material	This Month	Month Ago	Year Ago
Portland Cement	$2.26	†$2.26	$2.05
Common Brick	12.36	†12.35	11.70
Structural Steel	1.65	1.65	1.60
Lumber	16.50	†16.46	15.47

Prices given in this comparison are composite and do not in all cases refer to one item. For instance, the price of structural steel is the composite of prices of shapes and plates f.o.b. Pittsburgh; the price of lumber is a composite of five items of Southern pine and five items of Douglas fir f.o.b. mill; the price of cement is a composite of prices in fourteen different cities per barrel, carload lots, to contractors; price of brick is composite in fourteen cities per M, delivered on the job.

*As previously published in *General Building Contractor*.
†Revised.

First

IN QUALITY PERFORMANCE VALUE



MODEL K
Made in 5 Sizes
Maximum Capacity
3600 Gals. per Hour
Retail Price
(Size No. 1K)
$65.00

THE architect who specifies a Penberthy Automatic Electric Sump Pump for the removal of seepage water knows that his client is getting the best that money can buy—but at competitive prices. Penberthy Pumps are ruggedly constructed of copper and bronze throughout—they cannot rust. They are carried in stock for immediate delivery by plumbing wholesalers everywhere.

YOU CANNOT SPECIFY A BETTER SUMP PUMP

•

PENBERTHY PRODUCTS

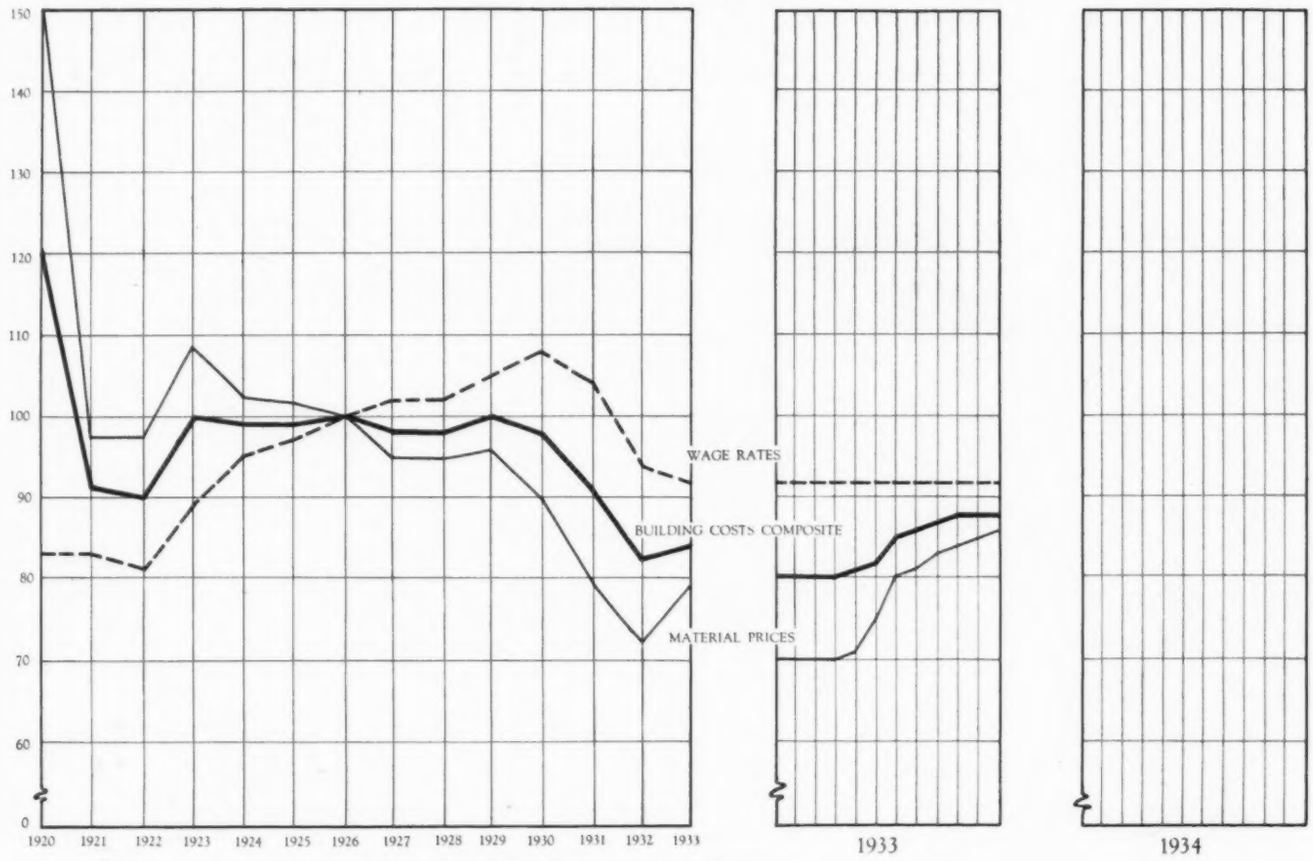
MODEL 33
Made in 1 Size Only
Maximum Capacity
1400 Gals. per Hour
Retail Price
$39.50

PENBERTHY INJECTOR COMPANY
Manufacturers of Quality Products Since 1886
DETROIT, MICH. - - - WINDSOR, ONT.

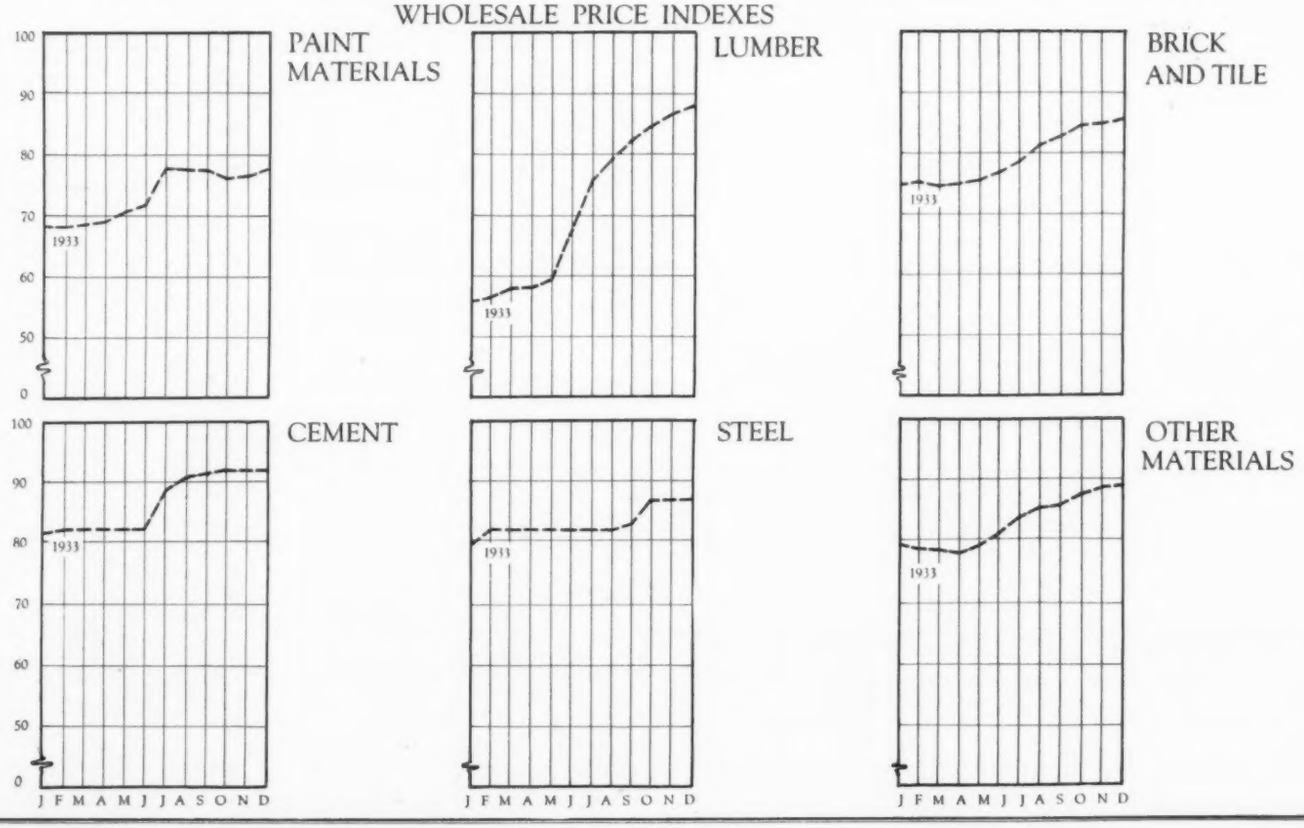
PENBERTHY SUMP PUMPS REMOVE SEEPAGE WATER

MATERIAL PRICES, BUILDING WAGE RATES AND BUILDING COSTS COMPARED

1926 Monthly Average = 100



WHOLESALE PRICE INDEXES



ARCHITECTS SPECIFY THIS ECONOMICAL FLOOR FOR THE FINEST MODERN SCHOOLS.

The finest modern schools

choose this economical floor . . .

When the architect for Riverside School was selecting the floor for this handsome kindergarten, economy was not his main objective. Yet he specified Sealex.

Sealex makes a quiet floor — easy on the nerves of teacher and pupils. It is sanitary — inexpensive to maintain. And it is built to withstand the heaviest traffic.

When Sealex Linoleum or Sealex Wall-Covering is installed by an authorized contractor of Bonded Floors or Bonded Walls, both materials and workmanship are backed by a Guaranty Bond. Congoleum-Nairn also offers a free consultation service in new construction or modernization projects. At your request, an expert flooring engineer will call to help you plan economical flooring specifications. Write us for details — no obligation. Congoleum-Nairn Inc., 195 Belgrove Drive, Kearny, N. J.

* * *

SEALEX WALL-COVERING Like Sealex Linoleum, this material is 100% practical for the school. It is quickly installed over old or new walls—with little noise or inconvenience. It is washable and sanitary —and insulation against heat, cold and noise. This wall-covering never fades or cracks—never needs to be repainted. Many beautiful designs.

NRA MEMBER U.S. WE DO OUR PART

SEALEX

REG. U. S. PAT. OFF.

FLOORS AND WALLS

WAGE SCALES IN THE BUILDING TRADES

Information Furnished by National Association of Builders Exchanges and Compiled by Division of Statistics and Research, F. W. Dodge Corporation, as of February, 15, 1934

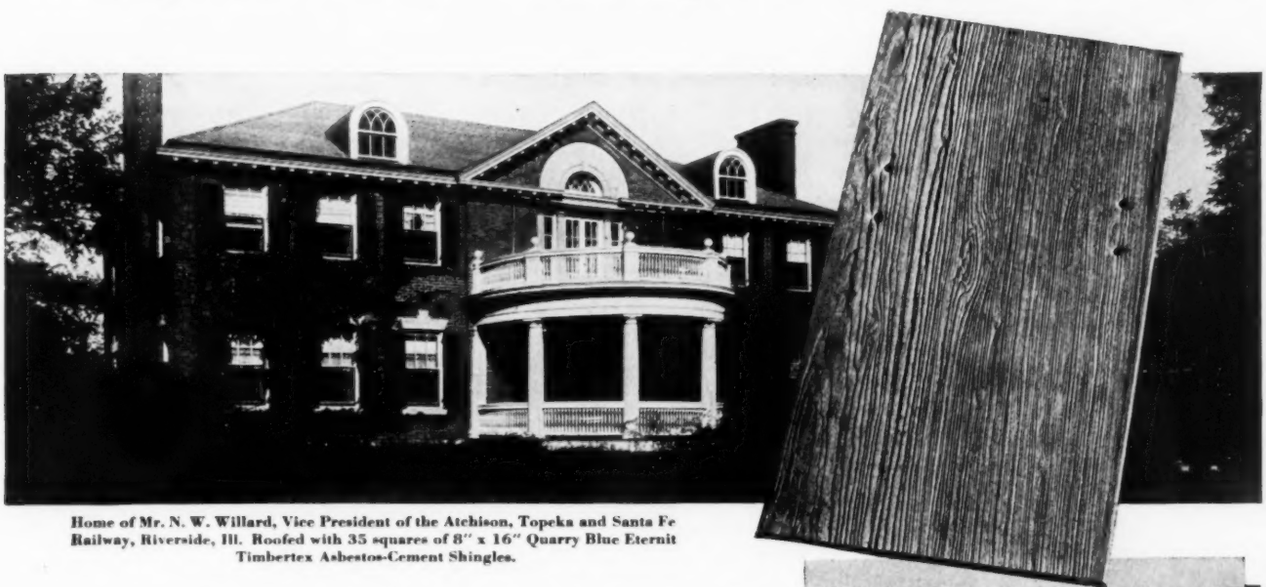
	Asbestos Workers	Bricklayers	Bricklayers Tenders	Carpenters	Cement Finishers	Electricians	Hoisting Engineers	Iron Workers—Ornamental	Iron Workers—Structural	Laborers	Lathers	Painters	Plasterers	Plasterers' Tenders	Plumbers	Roofers—Composition	Roofers—Slate & Tile	Sheet Metal Workers	Steamfitters	Stone Masons	Tile Setters	Tile Setters' Helpers
Akron	$1.00	$1.25	$0.45	$0.70	$0.70	$0.75	$0.70	$0.60	$0.60	$0.40	*$0.87½	$0.65	*$1.00	$0.62½	$0.85	$0.80	$0.80	$0.80	$0.85	*$1.25	*$1.25	*$0.50
Atlanta	1.00	1.25 1.40	‡.30 .45	.70	1.25	.90 1.10	.60 1.00	.35 1.85	1.25	.25 .35	1.00 1.25	.75	1.25	.30 .45	1.25	.80	.80	.90 1.00	1.25	1.00 1.25	1.25	.40
Baltimore	1.00	*1.00	1.00	.65	*1.00	*1.00	*1.25	*1.37½	*1.37½	.20 .30	*1.25	80 *.90	*1.25	1.00	*1.00	.75	.75	*1.12½	*1.00	1.00	1.25	.72
Boston	1.25	*1.30	.70	*1.17½	1.17½	*1.25	1.17½	*1.20	*1.20	.70	*1.25	*1.12½	*1.37½	*.95	*1.25	*1.17½	*1.05	1.17½	*1.25	*1.30	*1.30	*.95
Buffalo	1.00	*1.12½		*1.00	.90	*1.00	1.00	1.12½	1.12½	.40 .50	1.00	*1.00	1.00		1.00	.50	1.00	1.00	*1.00	*1.12½	*1.18¾	
Chicago	1.37½	1.50	.82½	*1.31¼	1.31¼	1.50	1.31¼	1.31¼	1.35	.82½	*1.50	1.41	*1.50	88¾	1.37½	1.37½	1.50	1.37½	1.37½	1.50	1.37½	1.00
Cincinnati*	1.15	1.25	.70	1.20	1.02½	1.25	.80 1.25	1.25	1.25	.45	1.31¼	1.15	1.37½	.70	1.25	.92½	1.07½	1.07½	1.12½	1.00	1.00	
Cleveland*	1.17½	1.25		1.12½	1.12½	1.37½	1.12½	1.25	1.25	.72½	1.25	1.00	1.25		1.25	1.15	1.37½	1.12½	1.25		1.25	.81¼
Columbus	1.00	1.30	.62½	.80	.80	1.00	1.15	1.25	1.25	.40	1.00	.80	1.00	.62½	1.00	.80	1.00	.80	1.00	.75	1.25	.50
Dayton*	1.25	1.30	.80	1.00	1.15	1.55	1.25	1.35	1.35	.35	1.10	1.00	1.25	.80	1.15½	.85	1.00	1.00	1.15½	1.30	1.50	.60
Denver††	9.00	12.00 *13.00	6.50 7.00	10.00	10.00 11.00	10.00 11.00	10.00	10.00 11.00	10.00 11.00	4.00 5.00	11.00	*10.00	12 00	7.00	11.00	7.00 8.00	7.00 8.00	9.00	9.50	12.00 13.00	10.50	†.62½
Des Moines	1 00	1 25	.65	1.00	1.00	1.00	1.00	1.00	1.00	.55	1.00	1.00	1.25	.75	1.25	1.12½	1 12½	1.12½	1.25	1.50	1.25	.80
Detroit	1.37½	1 25 max.	.55 .60	.80 1.00	.70 .90	1.25 1.40	.60 1.00	1.00 1.20	1.00 1.25	.50 .55	1.37½	.80 1.00	1.00 1.25	.70 .80	1.00 1.50	.70 .90	.80 1.00	.80 1.00	1.25 1.50	1.25 1.50	1.00 1.25	.80
Duluth	1 00	1.00	.50	.80	.80	1.00	.80		1.00	.50	.80	.80	1.00	.70	1.00	.70	1.00	.85	1.00	1.00	1.00	1.00
Erie		1.00	.45 .50	.80	.80	.90 *1.00	.90	.60 .80	.90	.35	.90	.60 .70	1.00	.40 .50	1.00	.50 .60	.80 .90	.80 .90	*1.00	1.00	.80	.40 .50
Houston		1.00	.35	.75	.75	1.00	.75	1.00	1.00	35		.62½	1.00	.35	1.00	.75	1.00		1 00	1.00	1.00	
Indianapolis	1.32½	1.62½	.90	1.22½	1.17½	1.50	1.37½	1.45	1.45	.40 .45	1.37½	1.25	1.57½	1.00	1.00	.60 .90	1 27½	1.22½	1.50	1.62½	1.50	.60
Kansas City	.90	1.32½	.80	1.00	1.00	1.00	1.00	1.00	1.00	.60	1.00	1.00	1.06¼	.80	1.00	.92½	.92½	1.00	1.00	1.12½	1.25	.62½
Los Angeles††	10.00	8.00	6.00	7.00	8.00	7.00	8.00	9.00	10.00	4.00	10.00	7.00	9.00	6.00	9.00	7.00	7.00	8.00	10.00	8.00	6.00	†.7 5
Louisville	1.12½	1.00	.50	.80	1.00	1.00	1.00	1.00	1.00	.25 .35	1.12½	.90	1.00	.50	1.12½	.30 .50	.85	.85	1.12½	1.25	1.00	.50
Memphis	1.00	1.37½	.50	.50	.50	1.00	.75	.75	.75	.20	1.00	.75	1.25	.50	1.25	.25 .40	1.12½	1.12½	*1.25	1.37½	1.25	.50
Milwaukee	1.00	1.00	.75	.92½	1.00	1.25	1.00	1.05	1.05	.60	1.00	1.00	1.00	.75	1.00	1.00	1.00	.92½	1.00	1.00	1.00	.75
Minneapolis	1.00	1.00		.80	80	1.00	.80	.90	1.00	.45	.75 .85	.80	1.00	.70	1.00	.70	.70	.80	1.00	1.10	1.00	.65
Nashville		1.00		.60 .75	.50	.75		.60	.75	.30	1.00	.62½	1.00		1.00	60	.60	.60	.75	.50	.75	
New Haven*		1.20	.50 .60	.80 1.06¼	1.20	.80 1.00	1.16¾ 1.27½	1.37½	1.37½	45 .65	1.27½	.80 1.00	1.20	.50 .60	1.06¼		1.5C	1.06¼	1.06¼	1.20	1.20	
New Orleans	.65 .80	1.25	.85	.55 .75	1.00	1.25	1.25	1.25	1.25	.35 .50	1.25	.75 .90	1.25	.75	1.00 1.25	.40	.90 1.15	.90	1.05 1.25	1.50	1.25	.35
New York City††	11.20	13.20	8 00	11.20	c11.20	11.20	12.40	11.20	13.20	6.60	11.20	9.00	12.00	8.50	c12.00	10.28	12.62	11.20	11.20	13.20	11.50	8.50
Oakland††	6.40	10.00	5.60	7.20	8.00	8.00	8 00	7.20	9.60	5.00	8.00	7.00	7.50	6.00	8.00	6.40	6.40	1.18	9.00	8.00	8.00	5.00
Oklahoma City††	8.00	8.00	4.00	6.00 8 00	8.00	6.00 8.00	8.00	8.00	8.00	3.50	.80	7.00 8.00	.80	4.00	.80	6.00	6.00	8.00			11.00	†.62½
Omaha	1.32	1.12½	.45	.90	1.00	1.00	1.00	.90	.90	.50	.90	.80	1.12½	.45	1.00	.72½	.95	1.00	1.00	.90	1.00	.50 .60
Philadelphia	1.00	1.50		1.00	1.05	1.25	1 18½	1.25 1.37½	1.00 1.37½	.40	1.37½	.62½	*1.37½	.90	1.15	1.00	1.25	1.25	1.15	1.00 1.25	1.25	
Pittsburgh	*1.50	*1.50		*1.25		*1.56¼	1.37½ 1.43¾	*1.37½	1.37½	70	*1.50	.87½	*1.50		1.50	*1.25	*1.50	*1.31¼	*1.50	*1.40	1.33¾	88.
Portland, Ore.††	8.00	*9.60	7.20	7.20	*7.20	*8.00	6.40 9.60	8.80	8.80	4.80	*8.80	7.04	*9.60	*7.20	*8.80	7.20	7.20	*8.00	*8.80	*9.60	8.00	7.20
Reading	.70 .80	.90	.75	.75	.85	.75				.35	.75	.70	.85	.75	.90		.80	.80	.90	.75	.90	.50
Richmond	.60 .65	1.25		.40 60	.35 .50	.80		.20 .70	.70	.20	1.00	60	.60		1.00	‡.25 .60	.25 60	1.00	.90	.75	1.25	
Rochester	.91	1 12½	.55	*.90	*1.12½	*1.15½	.90	.70-*1.00	.70-1.00	.55	.90	*.90	*1.12½	.55	*1.06¾	*.80	*.80	.90	*1.06¾	*1.12½	1.12½	.47½
Salt Lake††		9 00	5.00	7.20	8.00	8.00	8.00	8.00	8.00	4.00	8.00	7.20	9.00	6 50	8.00	7.20	8.00	8.00	8.00	9.00	8.00	4.00
San Antonio††	6.00 10.00	6.00 10.00	2.00 3.00	2 00 7.00	3.00 8.00	3.00 7.00	4.00 7.00	1.75 4.50	5.00 10.00	1.50 2.50	4.00 7.00	3.00 7.00	4.00 8.00	2.00 3.00	5.00 8 00	5.00 6.00	4.00 6.00	3.00 7.00	5.00 8.00	3.50 8.00	4.00 10.00	2.00 3.00
San Francisco	6.40	9.00	7.00	7.20	7.20	9.00	9.00		9.60	5.00	8.00	7.00	8.80	7.50	8.00	8.00	8.00	7.20	8.00		8.00	5.00
Seattle††	8.00	9.60	5.28	7.20	7.20	*8.80	8.00	8.00	8.80	4.75	*8.80	7.20	*9.60	*6.40	*8.80	7.20	7.20	8.00	*8.80	9.60	8.00	
Sioux City	1.00	1.00	.50	.85	.75	1.00	1.00	1.00	1.00	.50	.90	.90	1.00	.60	1.00	.90	.90	.85	1.00	1.00	1.00	.60
St. Louis	1.25	1.50	1.00	1.25	1.31¼	1.50	1.35- 1.47	1.47	1.47	.78¾	1.25	1.25	1.50	1.06¼	1.43¾	1.17½	1.25	1.25	1.43¾	1.25	1.25	.76½
St. Paul	1.00	1.00		.80	.80	1.00	.80	1.00	1.00	.50	.90	.80	1.00	.70	1.00	.80	.80	.85	1.00	1.00	1.00	
Washington, D.C.	*1.50	1.75	.50 .75	*1.37½	1.25	*1.65	*1.37½	*1.65	*1.65	.75	*1.62½	*1.37	*1.75	*.75	*1.50	*1.37½	*1.37½	*1.50	*1.50	*1.25	*1.50	.75
Wichita	.60	.75 1.25	.25 .40	.40 .75	.40 1.00	.50 .87½	.30 .75	.40 1.00	.40 1.00	.20 .40	.50 1.25	.50 .87½	.60 1.25	.25 .50	1.00	50 1.00	.50 1.00	.50 1.00	.75 1.12½	.75 1.25	.50 1.00	.25 .40
Youngstown††	*1.00	1.25	.60	.75-1.00	1.12½	1.00	1.12½	1.25	1.25	.40	1.00	1.60	1.25	.75	1.00	1.00	1.00	1.00	1.00	1.25	1.25	.81¼

NOTE.—Where two figures are shown they are the minimum and maximum. All figures are for hour rates except as indicated. ††8-hour day. †Rate per hour. *On 5-day week basis. c Correction. Asterisk after city indicates all trades on five-day week basis.

ABOVE DATA ARE WAGE SCALES AND DO NOT NECESSARILY INDICATE ACTUAL WAGE RATES BEING PAID IN THE RESPECTIVE TRADES

ETERNIT TIMBERTEX

The Beauty of a Weathered Cypress Shingle Wrought in Fire-proof, Rot-proof Asbestos-Cement



Home of Mr. N. W. Willard, Vice President of the Atchison, Topeka and Santa Fe Railway, Riverside, Ill. Roofed with 35 squares of 8" x 16" Quarry Blue Eternit Timbertex Asbestos-Cement Shingles.

This RU-BER-OID Style Leader Has Every Appeal That Wins Roofing and Modernizing Business

HERE is a shingle everybody wants—Eternit Timbertex. Although built from time- and fire-defying Asbestos-Cement, it has all the natural beauty and charm of a Weathered Cypress Shingle.

The beauty of the rich wood colors and the deep shadow lines are still further enhanced by the staggering of the ¼" thick tapered butts.

Buyers marvel at the remarkably low cost of all this beauty wrought in fire-proof, rot-proof Asbestos-Cement. Appliers are enthusiastic about the time-saving application features of Eternit Timbertex. Nail holes are pre-punched for two exposures and every shingle is shaped for perfect application.

Check the unusual features of this Ruberoid leader that is making roofing and re-roofing history. The coupon will bring you samples. Clip and mail it today.

1. **TIME AND FIRE-DEFYING**
   Ingredients: Portland Cement, reinforced with Asbestos Rock Fibres. Both are time and fire-defying.
2. **TAPERED CONSTRUCTION**
   Designed to provide thickness and strength where they are most required. Shaped for perfect application.
3. **CYPRESS TEXTURED**
   Entire shingle textured in various designs of weathered Cypress.
4. **WOOD COLORS**
   Five rich, soft "wood colors" of lasting beauty. The mineral oxide colorings are an integral part of each shingle.
5. **STAGGERED BUTTS**
   Double sets of punched nail holes permit laying irregular shingle courses.
6. **DEEP SHADOWS**
   Butts approximately ¼" thick give interesting shadow lines.
7. **MODERATE COST**
   Surprisingly reasonable first cost and no expense for upkeep.

The RUBEROID Co.
ROOFING MANUFACTURERS FOR OVER FORTY YEARS
ETERNIT MILLS, DIVISION OF THE RUBEROID CO.
Offices: BALTIMORE, MD., CHICAGO, ILL., ERIE, PA., MILLIS, MASS., MOBILE, ALA., NEW YORK, N. Y.
Factory: ST. LOUIS, MO.

THIS COUPON WILL BRING YOU SAMPLES

Asbestos-Cement Shingles	☐	Asphalt Shingles and Roofings	☐
Asbestos-Cement Sidings	☐	Built-Up Roofing Materials	☐
"Newtile" and "Newmarble"	☐	Safe-n-Dry Sheathing Paper	☐

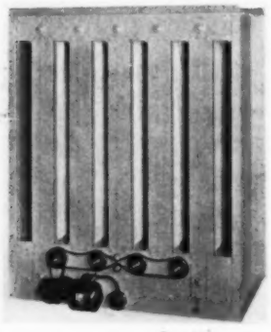
ETERNIT MILLS, DIVISION OF THE RUBEROID CO.
95 Madison Avenue, New York City, N. Y.
Please send full particulars about Eternit Timbertex Asbestos Shingles. Check at left for added information. AR-3-34

Name .....
Street Address .....
City ..... *State* .....

MANUFACTURERS' ANNOUNCEMENTS

Architects are invited to use the coupon on this page as a convenient means of obtaining manufacturers' publications describing in detail the products and materials mentioned.

C 1
AUTOMATIC, SELF-CLEANING AIR FILTER



A filter being introduced by the Coppus Engineering Corporation, Worcester, Mass., is said to eliminate labor and attention usually required for an efficient air filter. The Coppus Automatic Self-Cleaning Air Filter employs a wool felt for the filter curtain which is arranged in the shape of an endless belt running in zigzag fashion over rolls. The edges of the filter curtain are reinforced by belts which keep the filter curtain in laterally stretched position and provides an effective seal against passage of dirty air around the edges (patents applied for). The special wool felt gives the filter cleaning efficiency of 99% plus, not only against dirt, but also against invisible floating dust. The four bottom rolls are connected by chains and sprockets to a small geared electric motor, which is started either by means of a time clock at predetermined intervals, or with the help of a sensitive pressure gauge whenever a maximum air resistance is reached. The filter curtain moves slowly over the rolls and passes over a suction nozzle connected to a vacuum cleaner. Simultaneously with the motor of the filter drive the vacuum cleaner motor is started. The automatic cleaning operation takes place while the ventilating system is in operation and is finished within 15 to 20 minutes. The motion of the filter curtain, as well as the vacuum cleaner motor is then stopped automatically. The only attention required during the lifetime of an installation is the occasional emptying of the vacuum cleaner bag.

To Obtain Further Information

about any products mentioned, write the index numbers in space below. For literature about products *advertised* in this issue, give name of the product and manufacturer. Return coupon to The Architectural Record, 119 West 40th Street, New York, N. Y.

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City and State _____

C 2
UNITED STATES STAINLESS STEELS

A fifty-page booklet prepared by the United States Steel Corporation, tells the complete story of stainless and heat-resisting steels—their composition and suitability for specific uses. Quoting from the booklet's foreword, "The Subsidiary Manufacturing Companies of the United States Steel Corporation produce a comprehensive series of Stainless and Heat-Resisting Steels, which are available in finished and semi-finished products. These alloys are all of the relatively low carbon type, as distinct from the stainless cutlery grades, and may be broadly classified under the following two main headings: (a) Chromium Alloy Steels (Magnetic), (b) Chromium-Nickel Alloy Steels (Non-magnetic). In each of these classes there are obtainable a number of types and grades, differing in chemical composition, so that a selection may be made to meet specific requirements."

C 3
A. C. F. UNITFOLD FOLDING WALL

The use of the a.c.f.-Fairhurst folding wall in the Payne Whitney Gymnasium at Yale University is described in a folder containing four sets of photographs grouped to show the change effected by the simple opening and folding of this unitfold partition. Another folder, also by American Car and Foundry Company, illustrates the Fairhurst-patented Standard Wardrobe which is noted for its space-utilizing design. In the open position the doors of this wardrobe are entirely out of the way at the ends of each compartment. The doors pivot. There are no rollers or wheels, no track or slots on the floor.

C 4
HEATING COST CHART

A computation of heating costs based on the number of square feet of installed radiation required for various types of buildings is offered by the Spencer Heater Company of Williamsport, Pa. From these tables it is possible to estimate in advance the annual cost of fuel in the operation of Spencer magazine feed boilers. Computations take into consideration degree-days which for most of the principal cities in the United States are listed alphabetically in the chart folder. The chart consists of printed scales showing (1) the number of square feet of installed radiation, both for steam and water, (2) degree days, (3) tons of fuel used per season, (4) cost per ton of fuel, (5) the cost of fuel for the season. The heating cost for each individual case for the season is obtained by drawing straight lines across the scales from one number to the other, as applicable. Copies on request.

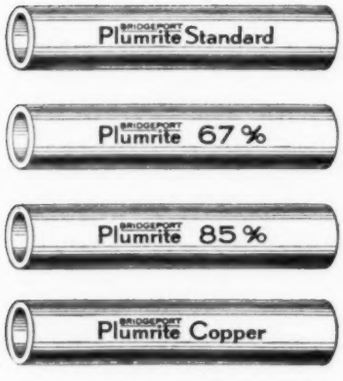
A Profitable
NEW DEAL
for
Old Buildings—

Modernized with Plumrite Brass Pipe

Just as a "man is only as old as his arteries," so most buildings are only as old as their plumbing . . . which can be economically renewed for many, many profitable future years simply by replacing the old rust-clogged pipe with non-corrosive PLUMRITE Brass Pipe.

A primary convenience today in any building . . . residential, industrial, mercantile . . . is unobstructed flow of clean water. The value of, and demand for, space is based upon such conveniences, rather than the age of the structure.

PLUMRITE Brass Pipe, with its long, enviable service record, is as ideal for replacement as for new work, because of its easy working qualities—cutting, bending, and threading. Where brass pipe is concerned, it pays to specify PLUMRITE.



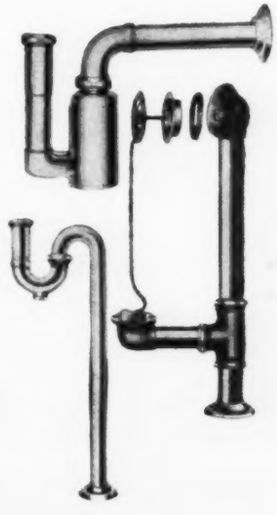
Four Plumrite Mixtures

There's a PLUMRITE mixture for every purpose and water condition . . . each assuring utmost dependability and freedom from maintenance, which results from using materials made to fit the job. Write for PLUMRITE booklet.

"Bridgeport" BRASS TRADE MARK CO.

Tubular Plumbing Supplies

A complete line to meet every requirement —contains many new distinctive features on practically every item—made with experienced care which has won for "Bridgeport" its popular favor with architects, owners, plumbers. New illustrated catalog on request.



Copper Water Tubing

Pure copper (99.96%), flexible—readily bent around obstructions. Also furnished hard in straight lengths. Recommended for underground service lines, inside replacement, and new work. Write for descriptive booklet.

Specify "Bridgeport" products at your Distributor's

BRIDGEPORT
BRASS COMPANY

• BRIDGEPORT, CONNECTICUT •

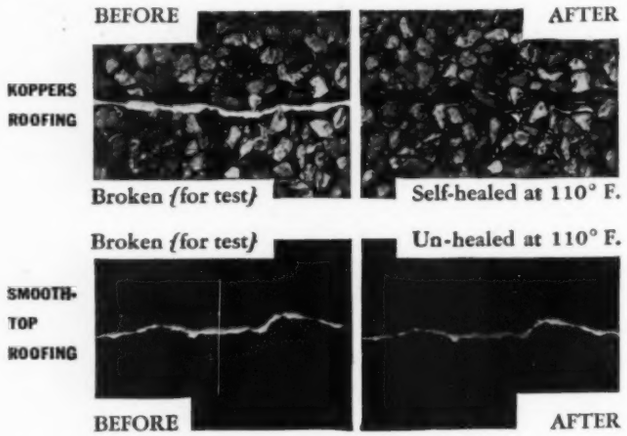
AKRON, BOSTON, CHICAGO, CINCINNATI, CLEVELAND, DAYTON, DETROIT, HOUSTON, LOS ANGELES, NEWARK, NEW YORK CITY, PHILADELPHIA, PROVIDENCE, ST. LOUIS, SAN FRANCISCO

ROOFING CRIMES NO. 2

Mechanical breaks may occur in any roofing. Settlement of the building . . . warping of timbers . . . or many other things may cause them.

When cracking occurs, does the damage *stop* there? That depends on whether your roof is self-healing.

Look at these photographs. See how the section of Koppers Roofing healed itself after being broken. See how the smooth-top roofing failed to heal.



KOPPERS Built-up Roofings possess ductility and pliability. These qualities enable them to withstand, to a high degree, vibrations and movements which tend to cause cracking. If, under extreme conditions, cracking *does* occur in Koppers Roofing, the sides of the cracks move slowly together until complete fusion takes place. This property is called "cold flow" and can be demonstrated in Koppers Roofings.

FOR YOUR ROOFS *specify*

1. KOPPERS COAL TAR PITCH
2. KOPPERS COAL TAR SATURATED RAG FELT
3. AND A GRAVEL OR SLAG SURFACE

KOPPERS PRODUCTS COMPANY
KOPPERS BUILDING - PITTSBURGH, PA.
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KOPPERS
New York - Providence
St. Louis

OTHER KOPPERS PRODUCTS: Membrane Waterproofing; Dampproofing; Tar Aluminum Paints; Plaster Bond Paints; Tarmac Road Tar for Streets, Driveways, etc.

Koppers Products Co., Pittsburgh, Pa.

Please send me additional information on self-healing of Koppers Roofings.

Your Name.....

Address.....

C 5
ASPHALT SIDING AND ROOF PAINTS

Two new types of asphalt siding and two roof applications are offered by The Barber Asphalt Company of Philadelphia. Asphalt sidings: (1) Double-Dip Tru-Brik Siding, an asphalt strip produced in a variety of colors, applicable to new building and remodeling, which is said to bear close resemblance to real face brick. Resistance to weathering is achieved by granular surfacing bonded by an asphalt cement. (2) Genasco 4-Point Siding Strip, an economical asphalt strip which lays up to a hexagonal pattern. Composed of saturated rag felt coated on both sides with an asphalt cement waterproofing.

The roofing preparations are (1) Genasco Resaturator, a saturant used to restore vitality to roofing felts that have become dry from exposure. It is intended as a conditioner rather than final protective coating; (2) Genasco Resurfacer, a relatively non-hardening asphalt coating with an admixture of asbestos fibers. It is a tough yet plastic film which will retain its elasticity indefinitely.

C 6
THRU THE WINDOW GLASS

Giving a brief, interesting description of the process of glass manufacturing, a booklet offered by Scohy Sheet Glass Co. of Sistersville, West Virginia, describes what is essential in equipment and personnel for a high quality window and heavy sheet glass.

C 7
CELOTEX FOR SOUND INSULATION

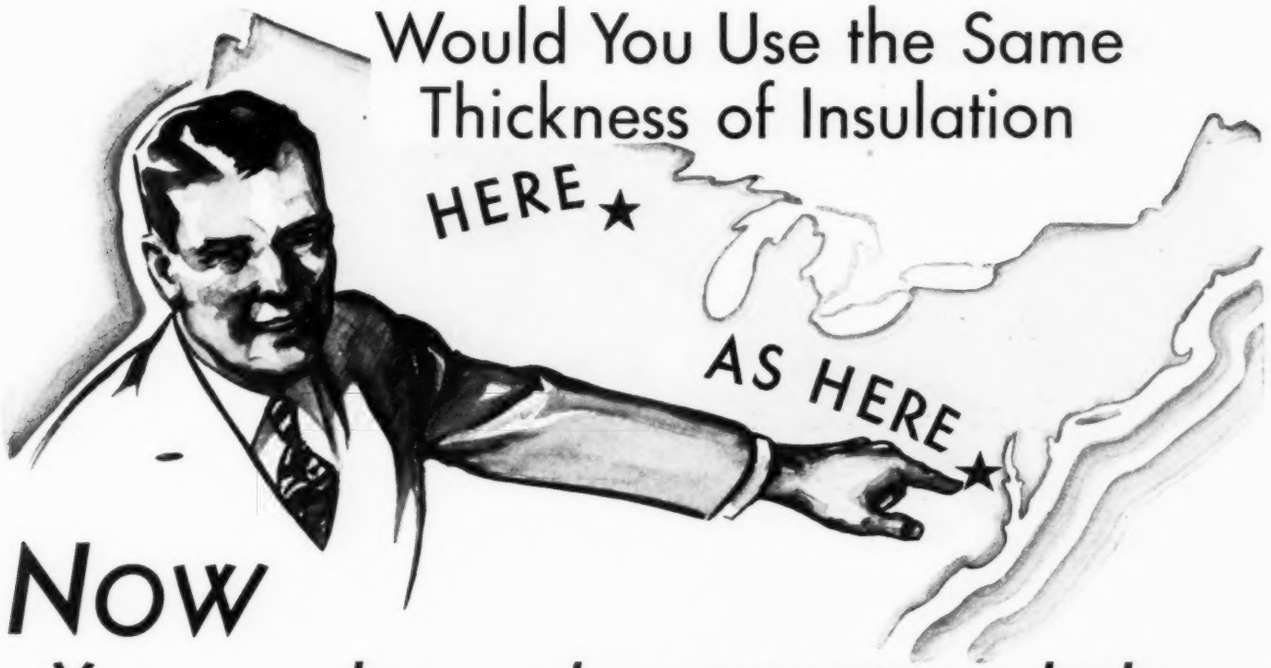
Prepared by the Research and Developments Department of the Celotex Company of Chicago, a folder, designated as Technical Note No. 10b, contains a complete, informative discussion of practical considerations and limitations which affect soundproofing of partitions, doors and floors. Facts relative to the degree of sound insulation, measured in decibels, necessary to obtain a desired quietness under various conditions are given in tabular form summarizing experiments conducted by this organization.

C 8
WESTINGHOUSE LIGHTING

A thirty-two page illustrated publication, entitled Westinghouse In the World of Lighting, has been issued by the Westinghouse Electric and Manufacturing Company. Significant developments in illumination are described in text and illustration. Floodlighting, bridge and streetlighting, signs, commercial and industrial lighting, also the lighting of aviation fields, fountains, swimming pools, stadiums, and homes are illustrated.

C 9
STEEL MANUFACTURING PROCESS

The Inland Steel Company, Chicago, has just issued a new edition of their booklet "Making Steel." The booklet tells a complete story of the process of making steel, brought up-to-date as to methods. It is well illustrated and written in non-technical language.

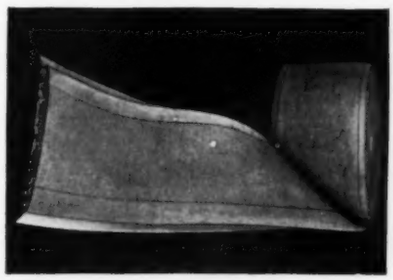


NOW

You can choose the ECONOMIC *thickness of Insulation for Any Building . . . . .*

In any building, there is an economic thickness of insulation beyond which it does not pay to go. This thickness varies in accordance with the type of construction, the kind and cost of fuel, and with the climate.

Now — with BALSAM WOOL Blanket Insulation—you can specify just the right thickness to give maximum, practical efficiency without waste. For BALSAM WOOL in its three thicknesses—½ inch, 1 inch and Wall-Thick—provides insulation to meet every requirement. In this thickness range there can be a selection to fit any pocketbook.



BALSAM WOOL is waterproof, windproof, verminproof and fire-resistant. It is firmly fastened in place and will not settle. It tucks into every crack and crevice and its thickness and density are controlled by careful manufacture and rigid inspection. The new sealed and flanged edges provide a sealed application—easier and cheaper to apply.

Get the complete facts about BALSAM WOOL Blanket Insulation. They are yours for the asking!

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Made By The Makers of
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WOOD CONVERSION COMPANY — **ST. PAUL • • • MINNESOTA**

Products of Weyerhaeuser

C 10
"THE WHITE BOOK"

An excellent selection of photographs distinguishes a booklet by Samuel Cabot, Inc., Manufacturing Chemists of Boston, Mass. The photographs show a variety of building types, principally residences, illustrating the use of the following Cabot specialties: Double-White, a brilliant, non-gloss, white combining unusual hiding power and wearing qualities; Old Virginia White, soft, brilliant, used for shingles, siding and other woodwork, also for brick, stone and stucco; Gloss Collopakes, enduring gloss colors said to have extraordinary covering power.

Double-White, the product featured in this booklet, is said to have a velvety texture when dry. It is chemically inert and not affected by gases or light. It is made by the patented Cabot Collopaking process in which the particles of white are reduced to submicroscopic fineness and colloidally dissolved in the vehicle, making it limpid and adhesive.

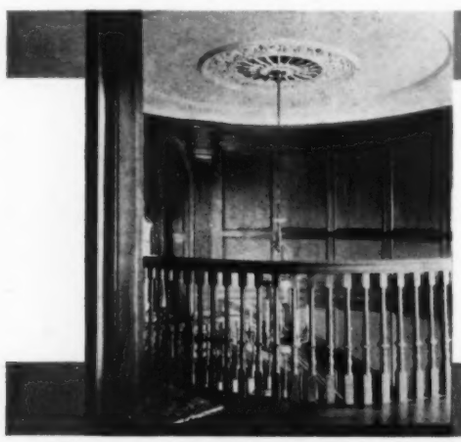
C 11
FINE TERRAZZO

The 24 natural color reproductions of fine terrazzo and several color photographs of terrazzo installations shown in a new booklet of the Universal Atlas Cement Company will prove helpful to architects in visualizing the effects which can be obtained in fine terrazzo floors. This booklet, containing specifications for terrazzo work as adopted by the National Terrazzo and Mosaic Association, is intended to provide the architect with a source book to which he can turn in designing fine floors. It not only shows him the effects possible with terrazzo but also enables him to show builders what they may expect in the finished floor.

C 12
BOILERS AND RADIATORS

The United States Raditor Corporation describes, in a colorful folder, the following equipment: (1) Capitol Red Top Boilers which burn coal, coke, oil or gas; (2) Capitol Oil-Burning Boilers, built of cast iron, designed especially for oil and used for large or small homes; (3) Capitol Fincast Radiators, concealed or free-standing type, all cast iron, one piece and jointless.

Another folder, by Pacific Steel Boiler Company, a division of United States Radiator Corporation, discusses the construction, portability, automatic operation, cleaning, hot-water supply, insulation and beauty of the Pacific oil-burning boiler. This boiler was specifically designed to obtain the highest possible efficiency with horizontally-fired burners.



TE-LEK-TOR *Remotely-Controlled*

Sound Systems for Residences

Te-lek-tor sound projectors and control points throughout a home bring broadcast and phonograph programs to every room and permit complete control of the entertainment from any spot. Te-lek-tor Loud Speakers located in walls or ceilings and concealed by decorative grilles, are better for sound reproduction than the largest cabinet speakers and also lend utility to decorations.

For example, a position above an open stairwell (illustrated) is acoustically ideal for a sound projector and solves the decorative problem of breaking the plainness of the ceiling.

Write for descriptive literature.

STROMBERG-CARLSON TELEPHONE MFG. CO., Rochester, N. Y.

Stromberg-Carlson

DEPENDABLE

For waste lines from all laboratories; for engraving and electroplating plants; for battery rooms; wherever there is acid . . . use DURIRON.

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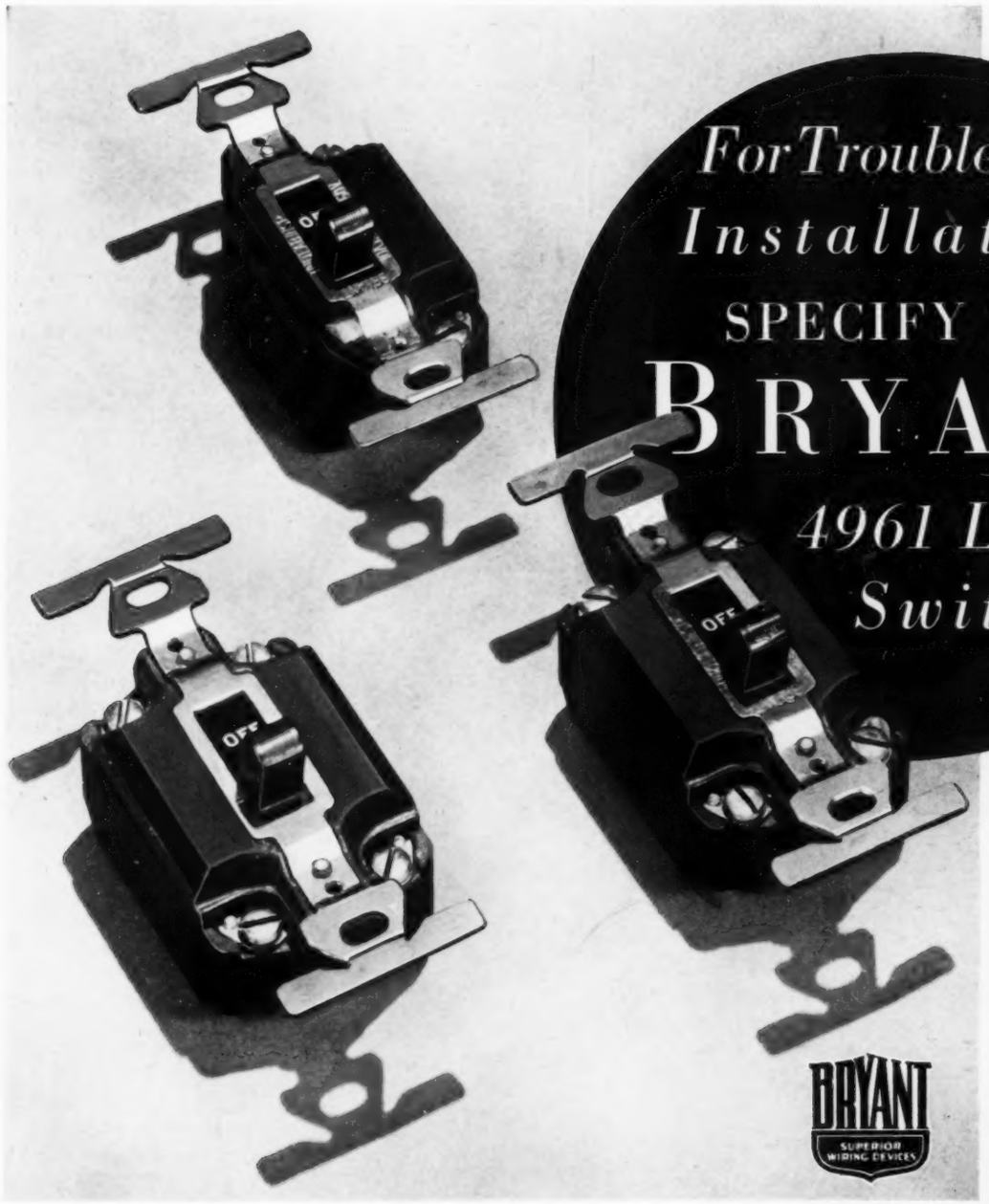

For Trouble-Free Installations

SPECIFY THE

BRYANT

4961 Line of Switches

DESIGNED to meet the existing demand for a high quality, heavy duty switch, The Bryant 4961 Line of Switches provide the utmost in long life and uniform performance. Quiet in operation, these switches are capable of withstanding an initial current inrush of more than eight times their rated capacity. They assure positive switch control for wiring installations of every character.

Easy to install, with many distinctive improvements, The Bryant 4961 Line of Switches cost but little more than ordinary switches. Specify them for all wiring installations where operating conditions recommend the selection of switches of The Bryant Superior Wiring Device Line.

BRYANT *Superior Wiring Devices*

Manufactured by THE BRYANT ELECTRIC CO., Bridgeport, Conn.

MANUFACTURERS OF "SUPERIOR WIRING DEVICES" SINCE 1888 . . . MANUFACTURERS OF HEMCO PRODUCTS

NEW YORK 60 East 42nd Street . . CHICAGO 844 West Adams Street . . . SAN FRANCISCO 149 New Montgomery Street

House in Hempstead, L. I. Architects, Godwin, Thompson & Patterson, New York. Painted with Cabot's DOUBLE-WHITE and Gloss Collopakes

"Collopakes" Keep This Prize House Young

In 1931, when this house won the House Beautiful 3rd prize, the brick walls were painted with one coat of Cabot's DOUBLE-WHITE and the iron work and trim with Cabot's Green Gloss Collopakes. When this picture was taken in 1933, all the painted surfaces were still fresh and bright.

Collopakes are modern colloidal colors, made by the patented Cabot Collopaking Process. They mark a new era in painting, giving a beautiful and lasting finish to shingles, brick, stone, iron, wood or plaster. Their texture is finer, their color values richer. They are economical to use, because their great covering power makes fewer coats necessary, and because of their non-fading qualities and unusual durability. DOUBLE-WHITE is a brilliant non-gloss white with tremendous hiding power. Gloss Collopakes keep their bright color and gloss even under severe weather conditions.

Send coupon below for full information

Cabot's Collopakes

FOR EVERY PAINT USE

Made by the Makers of Cabot's Creosote Shingle and Wood Stains

Samuel Cabot Inc.
Manufacturing Chemists

NRA MEMBER U.S. WE DO OUR PART

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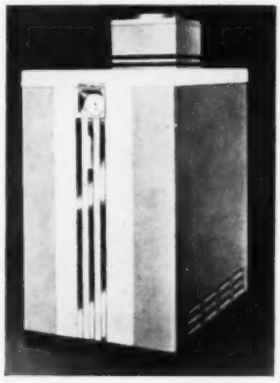
Boston, Massachusetts

Gentlemen: Please send me Color Card and information on Cabot's Collopakes.

Name .....

Address AR-3-34

C 13
NEW G. E. GAS FURNACE



The General Electric Company announces a line of residential and commercial gas-burning furnaces, supplementing its oil furnace placed on the market a year ago. The gas furnace is a coordinated unit with burner, boiler, control and all parts inclosed in a single jacket of distinctive appearance. Three types are offered: Series RM for small residences, series RK for larger residences and series CK for commercial installations where the total boiler load ranges from 475,000 to 2,333,000 B.t.u. per hour. Each series will be available for steam, vapor, or gravity hot water systems—in several different sizes, the proper size depending on specific requirements. Low-cost furnaces have been made possible by cast-iron sectional boilers, sectional arrangement of burners, and standardized control. In a given series, the size is increased by adding boiler sections and burners and by increasing the size of the gas-regulating and control valves. All G-E gas furnaces are fully automatic in operation except for lighting the pilots at the beginning of the heating season and turning them off at the end of the heating season. When in use, safety controls guide operation at all times. The electric circuit of the furnace is composed of a solenoid valve and thermal control, the latter consisting of day and night thermostats and a Telechron clock. All of these operate at 20 volts, supplied by a small transformer, total power consumption being only 10 watts.

C 14
WESTINGHOUSE SELF-CONTAINED ROOM COOLER

A self-contained room cooler has been developed by the Westinghouse Electric and Manufacturing Company. Three functions of weather-making are performed: cooling, removing excess humidity and circulating. The new room cooler is intended for hotel rooms, offices, small stores and homes. It can be moved from room to room as desired. Because all the equipment is in one cabinet, no lengthy refrigerant pipes are required and no basement or closet space is needed, greatly simplifying installation.

AIR REDUCTION COMPANY, INC.

On January 1, 1934, the Air Reduction Company, Inc., exercised its option on the balance of the capital stock of the Wilson Welder and Metals Company of North Bergen, New Jersey. Air Reduction is thus said to be the first of the oxyacetylene welding companies to own a 100% interest in an electric welding organization.